SCIENCES

INDUSTRIAL MEDICINE

APR 23 1945

Industrial Health, Occupational Diseases and Traumatic Surgery

April, 1945

The Permanente Health Plan
— For Industrial Workers —

Official Industrial Hygiene Services
— July, 1942, through June, 1944 —

Pathologic Changes in the Nervous System
— Due to Industrial Hazards —

Fascial Ligamentous Contractures
— Release in Physical Rehabilitation —

The Industrial Physician
— Professional and Personal Qualifications —

Monomeric Methyl Methacrylate
— Studies in Toxicity —

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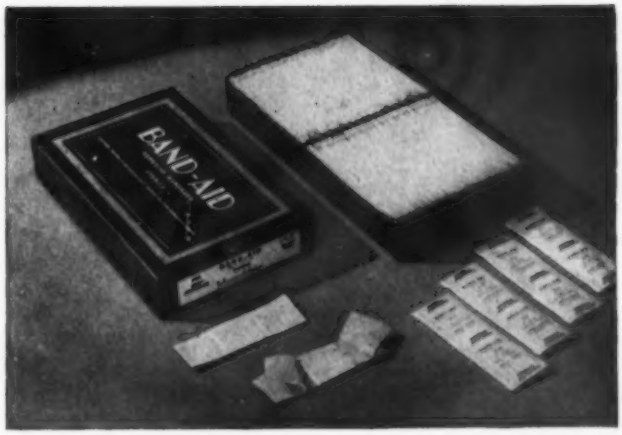

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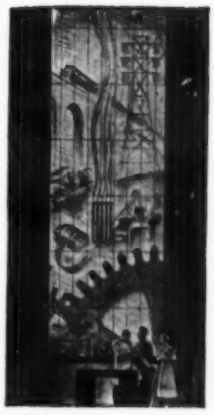

INDUSTRIAL HYGIENE
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& RAILROAD SURGERY

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TEN years ago this month DR. CAREY P. MCCORD's "Basophilic Aggregation Test for Lead Poisoning and Lead Absorption," then 10 years old, (see page 354) had had limited use; there were 1600 examinations in 1934. Addressing the Chicago Section A.I.H.A. on February 22 (see page 376), DR. MCCORD remarked that his present knowledge of its application, 20 years after its first use, includes more than 300,000 instances . . . . THE editorial in WARREN COOK'S "Industrial Hygiene Section" on "Informing the Worker" (page 357) brings out into the open and frankly discusses a subject as to which there has been too much apprehension, and hence too much reluctance. Following DR. HAMLIN'S forthright article in the March INDUSTRIAL MEDICINE, it emphasizes the need for the informer to be himself well informed. And it strongly highlights the trouble and expense that ensue when the informer is not well informed. The contrast between the approach of the industrial physician who *is* well informed *because he has to be* and that of the general practitioner who so often lets his "I-am-the-doctor" attitude persist over a lack of information is becoming increasingly apparent in a growing number of instances. This is particularly true in respect of lung conditions. In this connection we wish we could prevail upon every practicing physician to read the article by PENDERGRASS and LEOPOLD in *J.A.M.A.*, March 24, 1945, on "Benign Pneumonoconiosis," the authors' summary of which is quoted on page 32 here. This authoritatively confirms what the physician in industrial practice knows, namely, that "to differentiate between silicosis and benign pneumonoconiosis one must have a detailed knowledge of the occupational history, the environmental conditions of the worker and the precise information regarding the na-

—Continued on page 6.

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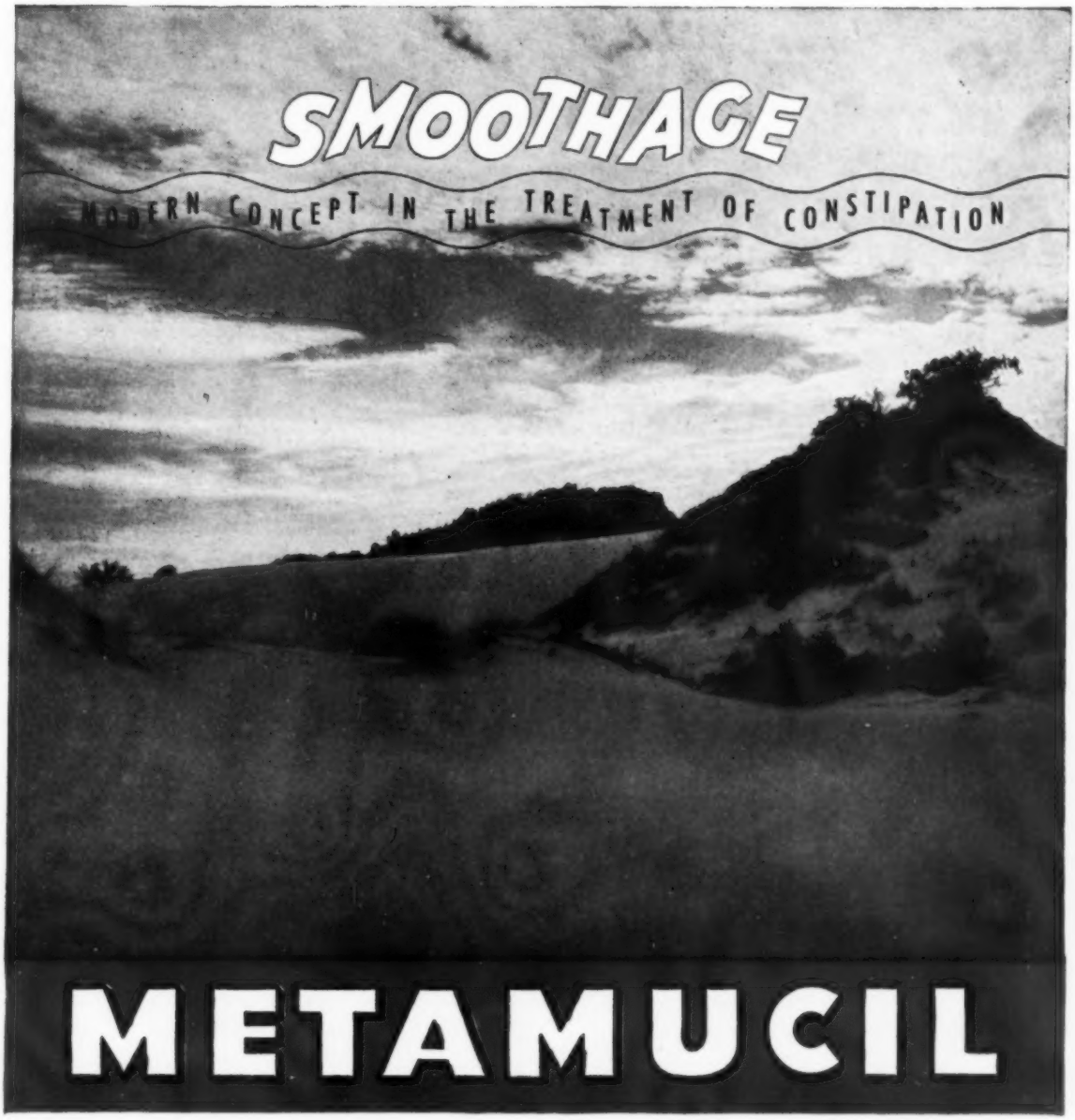

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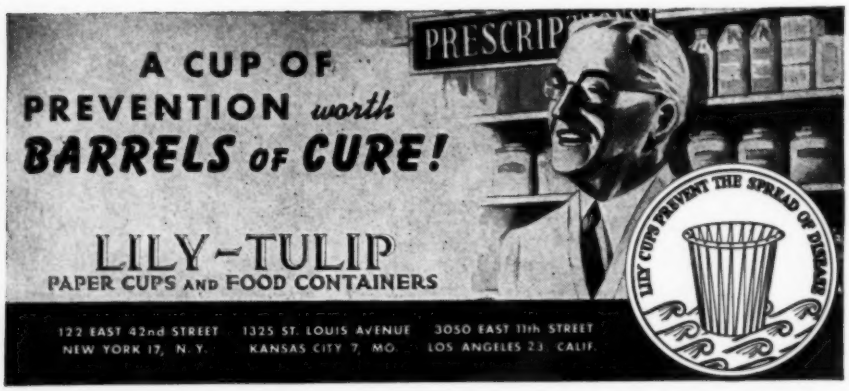
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ture, concentration and particle size of the dust to which he is exposed." It is unfortunate that this either is not known, or, as is sometimes the case, is known only to be ignored, by the physician outside of industrial work. One example of the trouble and expense that can be precipitated by the "unconsidered medical care" which doesn't know, or which disregards, the complete etiology of such a case was well, if temperately, described by DR. HAMLIN. Another is mentioned in the editorial. The cooperation between industrial physicians and "personal" physicians would be given a huge and effective impetus if every one of the latter would studiously note and carefully remember the PENDERGRASS and LEOPOLD article. . . . MAJOR MORTON'S "Management of Physically Handicapped Personnel" (page 306) was intended for presentation at the Third War Conference which was scheduled for this month but had to be cancelled, as announced in the February issue. This article should be of considerable interest to industrial physicians; it describes the policies and procedures in the management of those of limited physical capacities at a government installation, and treats frankly of some of the many unsolved problems involved in such management. . . . THE re-publications, under "Industrial Health and Disease" (page 314) are almost a textbook on industrial medicine. Techniques, teeth, ancillary services, nutrition, industrial medicine in general and in a small plant manifestation, and eye injuries — a veritable symposium, ably and authoritatively presented, recommended reading from which physicians can learn much and management more—the lesson for the latter stemming from the principle set forth by DR. WATROUS (page 314) that somewhere in the chain of supervision *"there has to be a physician."* . . . DR. KUH'S "Permanente Health Plan" (page 261) is a masterpiece of clear and informative writing, quite in keeping with the quality of what it describes. . . . WE ARE intrigued by the charge against Public Health Departments that, in objecting to H.R. 525 (page 288) they are "blocking Federal legislation." As we understand it, nothing is legislation until it is *law*. H.R. 525 isn't law, and *it should not become law.*"

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DR. LEONARD GREENBURG, Executive Director, Division of Industrial Hygiene, State of New York Department of Labor, is announced as one of the two second-prize winners in the contest recently conducted by *Modern Hospital* for the design of community medical centers housing a hospital, with headquarters for the local health department and offices for local physicians and dentists.

DR. JOSEPH L. FETTERMAN, Major Medical Corps (Inactive), was recently retired from the Army, where he was Executive Officer of the School of Military Neuropsychiatry. He has re-established his home and practice in Cleveland, Ohio. DR. FETTERMAN is the author of "The Mind of the Injured Man" (see page 22).

DR. LOWELL S. SELLING has announced his return to private practice at 1078 Fisher Building, Detroit, after resigning on his tenth anniversary as Director of the Psychopathic Clinic of Recorder's Court. DR. SELLING has limited his practice to psychiatry including child guidance and industrial personnel counselling.

DR. ANTHONY J. LANZA, DR. H. H. FELLOWS, and DR. ALBERT O. JIMENIS have been appointed Associate Medical Directors of Metropolitan Life Insurance Company, New York. DR. LANZA, recently honorably discharged from the Army as COLONEL, M.C., has been awarded the Legion of Merit for his work in the development of the Army's health program for civilian workers in Army-owned and operated industrial plants.

DR. ROLAND R. CROSS, Springfield, Director of the Illinois Department of Public Health, has been named by Governor Green as chairman of an advisory committee on medical services to serve with the governor's committee on veterans' rehabilitation and employment.

THE FIRST student to enroll for post-graduate work in the Department of Industrial Hygiene of the University of Pittsburgh School of Medicine is DR. JORGE VERGARA, of Bogota, Colombia, South America. DR. VERGARA is a graduate of the Universidad Nacional-Facultad de Medicina in Bogota and served his internship in Hortua's Hospital, Colombia, in 1941-42. Following his internship, he served as assistant physician in Nacional Reformatori and as medical chief, Textil Industry, Carulla & Cia in Bogota and medical chief, Gold Mine, Pato Consolidated An-

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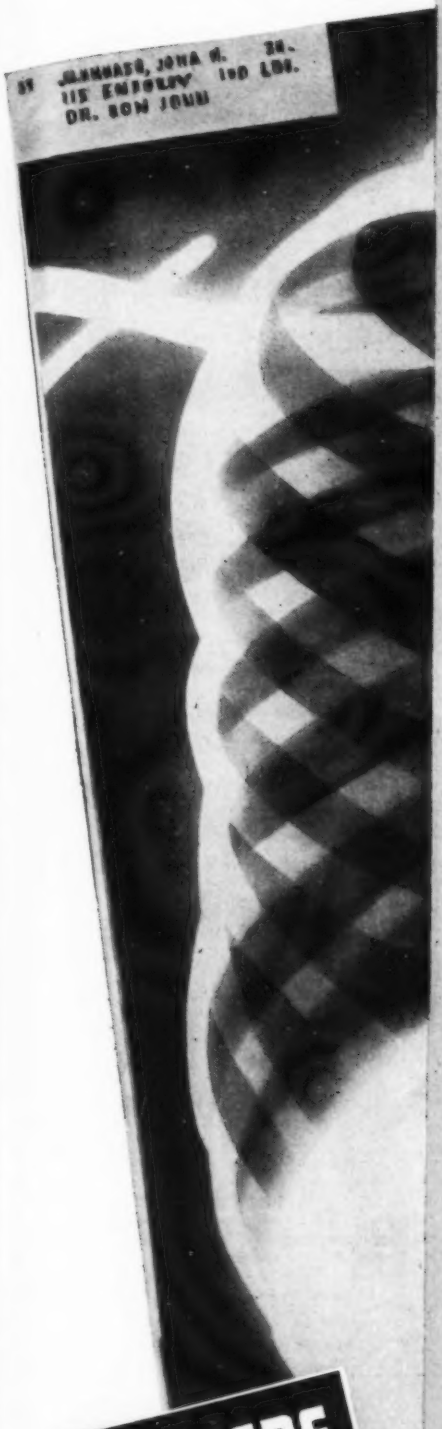

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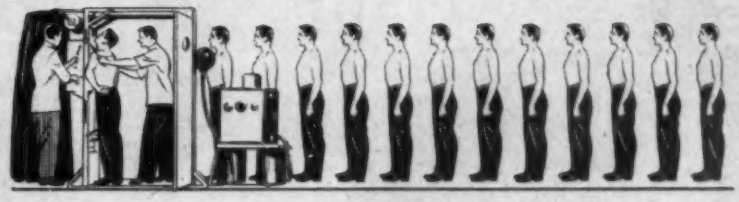

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tioquia. In 1944 DR. VERGARA won by competition a scholarship for graduate study in the United States, offered foreign students by the U. S. State Department. He came to the United States for special training in the field of industrial medicine and selected the University of Pittsburgh as offering the best opportunities in the field. DR. VERGARA'S course of instruction will include a period of time with the staff of Industrial Hygiene Foundation.

DR. ROBERT C. TOWSE has been appointed medical director at the Rennsselaer plant of the Winthrop Chemical Company, Inc. DR. TOWSE was an Army instructor at Camp Pickett, Virginia, until March 1943, when he was given a medical discharge. A specialist in surgery, he previously had been associated with St. Agnes Hospital, White Plains, Northern Westchester Hospital, Mt. Kisco, New York, and Grasslands, the Westchester County hospital. He was graduated from Dartmouth College and the College of Physicians and Surgeons, Columbia University.

DR. A. C. DICK, San Diego, California, recently resigned as Medical Director, Consolidated Vultee Aircraft Corporation, announces the resumption of practice in general medicine and surgery with special emphasis on industrial consultation.

EXTENDING further the consultative services to the States by the Industrial Hygiene Division, U. S. Public Health Service, SURGEON (R) WALTER E. DOYLE, Chief of the Division's Medical Unit, is planning to visit every state and local industrial hygiene unit in the nation within the near future. DR. DOYLE recently completed the first of these tours, in U. S. Public Health Service District 7, comprising the industrial hygiene units of Minnesota, Iowa, Missouri, Arkansas, Oklahoma, and Kansas. He is making the annual evaluation conducted by the Industrial Hygiene Division in the units he visits, although major emphasis is placed upon giving aid in the medical control of occupational disease.

CHARLES-EDWARD AMORY WINSLOW, DR.P.H., Anna M. R. Lauder professor of public health and chairman of the department, Yale University School of Medicine, New Haven, will conclude 30 years' service with Yale when he retires at the end of the current academic year. COL. IRA V. HISOCK, S. C., A. U. S., professor of public health, now on leave of absence at Yale, has been named to succeed DR. WINSLOW as chairman of the department as soon as he concludes his service with the Army. He is currently chief of the public health section of the Civil Affairs Division of the War Department. COLONEL HISOCK has been associated with Yale since 1920.

—*J.A.M.A.*, March 31, 1945.

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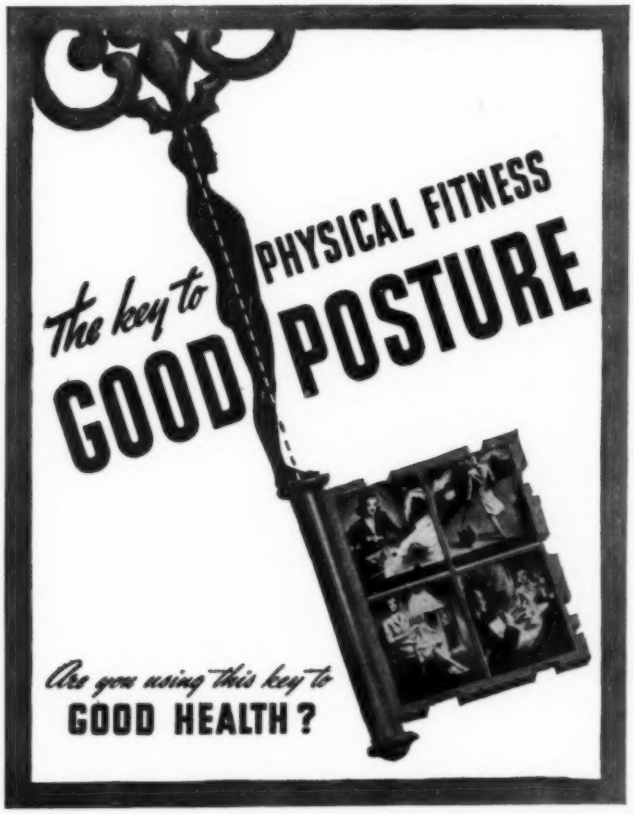

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THE Society for Investigative Dermatology announces the resumption of publication of their periodical, the *Journal of Investigative Dermatology*, which temporarily suspended publication in 1942 on account of war conditions. The first number of Volume 6 appeared in February. It will be issued bimonthly, one volume a year, at $6.00 per volume, by The Williams and Wilkins Company, Baltimore 2, Maryland.

Nutrition and Absenteeism

TO DR. ROBERT S. GOODHART, Chief, Industrial Feeding Program Division, Civilian Food Requirements Branch, War Food Administration, Office of Distribution, Washington 25, D. C. from R. J. CANNIFF, Advertising and Sales Promotion Manager, Servel, Inc., Evansville, Indiana: "DEAR DR. GOODHART: The October (1944) record of Servel employee absences established a new low record of 2.6%. It is important to note that the absenteeism covers all causes. The number of absences from common illnesses has been reduced to a negligible and very satisfactory percentage. Much of this good record is due to the effectiveness of the continued promotion of our Industrial Nutrition Program. I thought you would be interested in having this report."

—From Industrial Nutrition Service, March, 1945.

Plasma in a Mine Accident

PITTSBURGH Coal Company has been commended to State Secretary of Mines Richard Maize for using blood plasma at the scene of an accident to save the life of a seriously injured worker at Euclid Mine, Smithton, on February 22. The company, through its medical department, recently installed blood plasma units for emergency use at each of its 17 mines. State Mine Inspector James R. Walthour expressed belief that it was the first instance of blood plasma use at a coal mine. The victim of the accident was working at the bottom of a 189-foot coal hoisting shaft when he was struck on the head and shoulders by falling ice. His head was badly lacerated and a shoulder blade broken. DR. MCCLAIN POST, of Smithton, who arrived on the scene 10 minutes later, found the miner unconscious and suffering from severe

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shock. Usual treatment for shock had no effect. DR. POST then began administering the plasma from the mine kit. It was the first time in his 15 years of medical practice that DR. POST had ever used plasma. The treatment took an hour and a quarter. By that time the miner had responded sufficiently to permit his safe removal to the hospital, where he is now recovering.

Sprains and Strains

Two meetings were held by the safety supervisors of our plants, one on February 5, at New York, and one on February 14, at Pittsburgh. This year the plant physicians were invited to attend, and participate in the programs. There were 75 men present at these two discussion groups. Both meetings

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TO provide an organization, not for pecuniary profit, in which all agencies and societies, both medical and lay, concerned with the problems of industrial health can hold membership and can meet together in conference for the study, discussion and careful consideration of all industrial health problems and procedure; to engage in scientific research to determine the cause, nature, prevention and cure of diseases and injuries of occupations; to assist in establishing and supervising industrial health clinics to serve small industries; to establish and maintain hospitals which will furnish facilities for the care, treatment and study of occupational injuries and diseases; to make surveys of industrial medical services and recommendations for their improvement; to solicit, receive and administer funds for any purpose that will advance and/or improve industrial health; to establish undergraduate and/or post-graduate courses in industrial medicine and surgery and/or to cooperate with medical schools and industries in maintaining such courses; and to use all those means which from time to time, may seem wise for the advancement of industrial health

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Provides even, uniform, steadily maintained pressure—remains elastic

Aloe cotton elastic bandages are woven of long staple cotton and "VINYON E"—a vinyl resin yarn—which has been found to produce a superior type of elastic bandage because of its natural elasticity. These improved elastic bandages will provide even, uniform, easily controlled and steadily maintained pressure in all conditions where an elastic bandage is indicated. High quality feather-edge prevents binding. Special weave permits free movement, ventilation and circulation. Unlike most other elastic bandages, Aloe cotton elastic bandages with "VINYON E" do not have to be washed daily in order to retain their elasticity. Washing need only be done when bandage becomes soiled. Each size bandage listed below measures approximately 5½ yards when stretched and is furnished with two metal clips in cellophane wrapped and sealed package.

	Each	Per Doz.
HH5934—Aloe Cotton Elastic Bandage with "VINYON E," 2-inch width	$0.63	$ 6.30
HH5935—Same, 2½-inch width	.76	7.65
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were called to order by DR. T. LYLE HAZLETT. . . . SPRAINS and strains resulting from accidents were interestingly explored by DRS. C. D. STULL and W. H. ROBINSON. The thoughts developed by these prominent physicians indicated the need for more and better methods of training workers in the best ways to lift objects and in working postures. MR. C. R. REID explained the educational program in proper lifting methods being conducted at the East Springfield Works.

—Westinghouse *Safety News*, March, 1945.

Absenteeism Increase

ABSENTEEISM due to sickness among male industrial workers showed a substantial increase for the third quarter of 1944, sending the total industrial sickness rate in this year up to 37% above the average for the period 1935-1944, according to statistics released by the Industrial Hygiene Division of the U. S. Public Health Service. Non-respiratory-non-digestive diseases rose 15% above a like period in the previous year. Conditions contributing to this record included a 26% increase in rheumatism, a 29% increase in neurasthenia and other diseases of nervous or mental origin and a 34% increase in diseases of the genito-urinary system. The incidence of rheumatic diseases, diseases of the heart and arteries, nephritis and nervous diseases has never been equaled or exceeded within the past decade. Nervous diseases showed the highest rate of increase, rising 76% above the 10-year mean. The rate of respiratory diseases, while slightly lower than in 1943, was 32% above the average for the decade. Digestive diseases also rose to a rate exceeding anything experienced within the 10-year period. Employment conditions peculiar to wartime are held responsible. Categories of disease showing the highest increase involve mainly older workers. The hiring of workers long unemployed or retired is one factor held to contribute to the record sickness rate, as is the employment of youths and other inexperienced personnel and the necessity for employing in industry men rejected by the armed services. Wartime working and living conditions are thought to be reflected, since other factors held accountable include emotional strain and personal mental conflict, overcrowding in plants and war communities, fatigue due to the lengthened work week, and night work.

—*J.A.M.A.*, March 10, 1945.

Fume Conscious

OFFICIALS of Steamfitters Local No. 590 were concerned, some weeks ago, with reports that some of their members were exposed to harmful fumes resulting from the use of carbon tetrachloride on ships in harbor in the San Francisco Bay. The Union Health Committee and union officials asked the Maritime Commission to investigate. COMMANDER H. G. BECK, Assistant Chief Health Consultant of the Health and Safety Office, District 12, promptly made tests, and, as a result, received assurance that in future carbon tetrachloride will be used only in a closed process, protecting workers against the hazard of injurious fumes.

—*Newsletter*, Northern California Union Health Committee, 2:3, March 1, 1945.

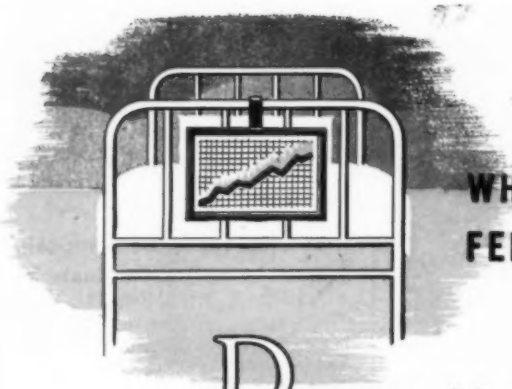
On the Farm

THE chief occupational hazards of the farm worker population are muscle strain, heat exhaustion and sunstroke, rhus dermatitis, and accidents in connection with farm machinery. All of these tend to occur most frequently early in the work season, when the workers are not yet adjusted to the difficulties of field labor. Many of the workers are quite unaccustomed to the use of the muscles involved in picking crops, particularly root products or other low-growing vegetables, so that low-back pains and leg soreness are common. While toxic effects from poisonous plant sprays are, of course, possible, none has been specifically encountered.

—From "Public Health and Medical Services for Migratory Farm Workers," *Public Health Reports*, 60:9, March 2, 1945.

Royalty for Medical Service

IN presenting his demand to bituminous coal operators for a 10-cent royalty on every ton of soft coal mined, John L. Lewis, president of the United Mine Workers, said that



WHEN FLAMES OF HYPERMETABOLISM FEED ON BODY PROTEINS . . .

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Relief of Pain...
is of paramount importance in the treatment of rheumatoid arthritis . . . The salicylates rank first for this purpose from the standpoint of both safety and efficacy."*
Full clinical advantage of the analgesic effect of salicylates with sodium iodide is made possible by prescribing—
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Salici-Vess
(Buffered Salicylate-Alkali with Sodium Iodide)
The buffer alkali mechanism in association with the CO_2 effervescent factor helps protect against salicylate irritation, speeds emptying time of the stomach and hastens absorption.
Salici-Vess is supplied in convenient prescription bottles of 30 tablets.
*Short, C. I. and Bauer, W.: The Treatment of Rheumatoid Arthritis, New Eng. Jl. Med., 227:442-450 (Sept. 17) 1942.
AMES COMPANY, INC.
ELKHART, INDIANA

the money, estimated to yield $62,000,000 annually, would provide for his 400,000 union members "medical service, hospitalization, insurance, rehabilitation and economic protection." Although some operators strongly oppose the proposals, Charles O'Neill, head of one of the big coal producers' associations, admitted that the Lewis plan had "actuarial merit" and said that there was need for health insurance in other industries such as steel, as well as in coal mining.

—*J.A.M.A.*, March 10, 1945.

Insect-Bite Dermatitis

AN OUTBREAK of dermatitis in a Massachusetts electrical equipment company, which affected 32 out of 36 girls employed in assembling balancing coils and which mystified local physicians, was found to be caused by the bite of rat fleas, in an investigation made by personnel of the Industrial Hygiene Division, U. S. Public Health Service, at the request of the Division of Occupational Hygiene of the Massachusetts State Department of Labor and Industries. This diagnosis was sustained by the fact that the building was heavily rat infested, and was based upon experience with similar outbreaks in temporary buildings housing government agencies. Recommendations included sanitary disposition of lunch refuse, to prevent rats from feeding upon it, and obliteration of rat breeding places in the building.

—*Industrial Hygiene News Letter*, February, 1945.

Nursing and Dentistry Units

UNDER a reorganization of the Industrial Hygiene Division, U. S. Public Health Service, effective in February, industrial dentistry and nursing have been established as separate units. DR. LYMAN D. HEACOCK is Chief of the Dental Unit, and MISS F. RUTH KAHL is Chief of the Nursing Unit. These activities now have organization status parallel to the medical, engineering, chemical, and statistical activities of the Division.

Industrial Medicine Symposium

NEW YORK Post-Graduate Medical School and Hospital, Columbia University, conducted an inter-departmental Symposium on Industrial Medicine April 2-6, under the direction of DRS. HARRY J. JOHNSON and FRANK R. FERLIANO in which, together with members of the teaching staff of the medical school, the following were speakers:

DR. LEVERETT D. BRISTOL, chairman, committee on education, Council on Industrial Health, American Medical Association.

DR. C. CHARLES BURLINGAME, associate in psychiatry, Columbia University College of Physicians and Surgeons, and chairman, committee on industrial medicine, American Society for Research in Psychosomatic Problems.

MISS PATRICIA EDGERLY, director, New York Medical Exchange.

FREDERICK B. FLINN, PH.D., professor of industrial hygiene, DeLamar Institute of Public Health, Columbia University.

DR. FORREST D. GIBSON, Hartford, Conn., Hamilton Standard Propeller Division, United Aircraft Corporation.

DR. EUGENE J. GILLESPIE, Washington, D. C., tuberculosis control division, U. S. Public Health Service.

DR. EDWARD C. GREENE, medical director, American Air Lines.

DR. JOSEPH P. HOGUET, medical director, Republic Aviation Corporation.

DR. JOHN F. JOHNSON, medical director, Eastern Aircraft Division, General Motors Corporation.

DR. ANTHONY J. LANZA, associate medical director, Metropolitan Life Insurance Company.

DR. RAPHAEL LEWY, chief medical examiner, New York State Department of Labor, Compensation Bureau, New York.

DR. RICHARD M. MILLS, Brooklyn, medical director, New York Telephone Company.

DR. DWIGHT O'HARA, Boston, acting director, division of industrial medicine, Liberty Mutual Insurance Company.

DR. CHARLES R. WILLIAMS, supervisor, industrial hygiene field service, Liberty Mutual Insurance Company.

Chicago Society

CHICAGO SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY will hold its Annual Scientific Meeting at Merchandise Mart (Merchants' & Manufacturers' Club), 222 W. North Bank Drive, Chicago, on April 27, at 8:30 P. M. DR. KARL G. RUNDSTROM, program chairman announces the meeting subject as "The Traumatic Abdomen," with COLONEL WILLIAM BARCLAY PARSONS, Surgical Consultant 6th Service Command; pre-Army, Associate Professor Surgery, Columbia University College of Physicians & Surgeons, as guest speaker, and a discussion, following, by GEORGE L. APFELBACH, M.D., F.A.C.S., Assistant Professor Surgery, Northwestern University Medical School, and Attending Surgeon Cook County Hospital; JOHN D. ELLIS, M.D., F.A.C.S., Instructor in Surgery, Northwestern University Medical School, and Senior Surgeon St. Luke's Hospital; FREDERICK W. SLOBE, M.D.,

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Machlett Laboratories, Springdale

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Though little was known about X-rays at that time, one thing was clear to the men using them: the best tubes available were made by Machlett. We believe that is still true today.

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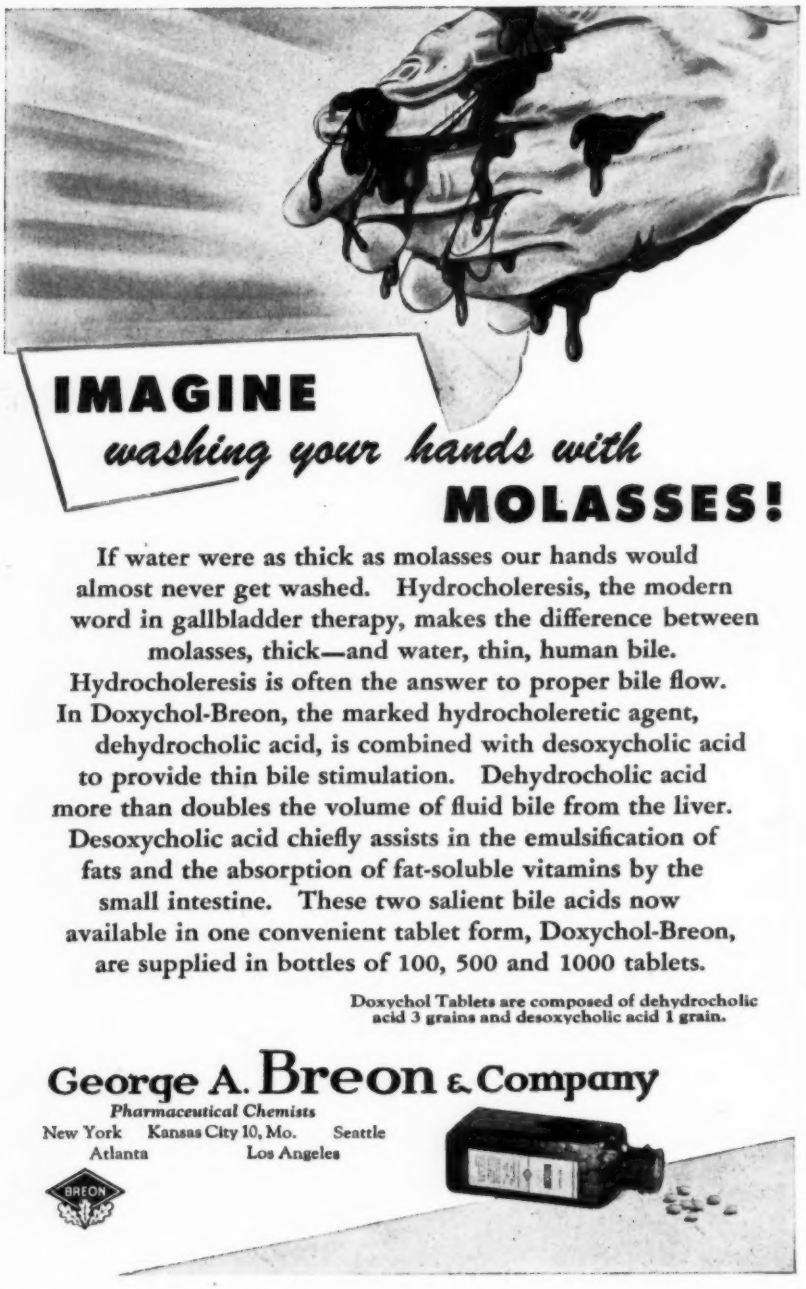
TODAY THEIR LARGEST MAKER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General Motors Medical Dinner

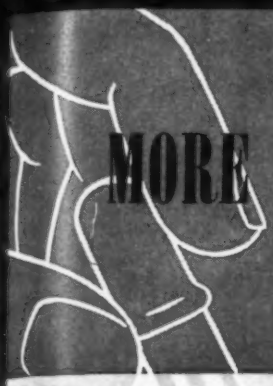
GENERAL MOTORS CLUB was host to the medical profession of Baltimore at a Medical Dinner on March 21. The program, following an opening address by M. H. BODEN, President, General Motors Club, included DR. W. J. FULTON, Medical Director, Eastern Aircraft and Chevrolet, Baltimore Division, on "Industrial Medicine"; DR. J. F. JOHNSON, Medical Director, Eastern Aircraft, Linden Division, "Industrial Hygiene Movie and Commentary"; M. J. MCCARTHY, Safety Director, Fisher Body, Detroit, on "Safety"; and a Summary by DR. C. D. SELBY, Medical Consultant, General Motors, Detroit. Special guests were: DR. HUNTINGTON WILLIAMS, Commissioner of Health, Baltimore City Health Department; DR. MIRIAM E. BRAILEY, Director, Bureau of Tuberculosis, Baltimore City Health Department; DR. J. M. MCDONALD, Director, Bureau of Occupational Disease, Baltimore City Health Department; DR. M. ALEXANDER NOVEY, Acting Director, Bureau of Venereal Disease, Baltimore City Health Department; DR. FERDINAND A. KORFF, Director, Bureau of Food Control, Baltimore City Health Department; DR. W. H. SCHULTZ, Director, Division of Industrial Hygiene, Baltimore City Health Department; CAPTAIN W. D. ALLERS, Director, Army Industrial Hygiene Laboratory, School of Hygiene and Public Health, Johns Hopkins University; DR. ANNA M. BAETJER, Associate, School of Hygiene and Public Health, Johns Hopkins University; DR. J. G. TOWNSEND, Chief, Industrial Hygiene Division, U. S. Public Health Service; DR. W. F. REINDOLLER, Director, Division of Industrial Hygiene, Maryland State Department of Health; JOHN F. MCMAHON, Managing Director, Industrial Hygiene Foundation, Pittsburgh; THEODORE C. WATERS, Baltimore, Chairman Legal Committee, Industrial Hygiene Foundation; DR. C. O. SAPPINGTON, Industrial Consultant; Editor of INDUSTRIAL MEDICINE, Chicago; EMANUEL GORFINE, Chairman, Maryland State Accident Commission; DR. H. C. BLAKE, Physician, Maryland State Accident Commission; DR. N. B. HERMAN, Maryland Occupational Disease Board; DR. J. W. PIERSON, Maryland Occupational Disease Board; DR. G. CARROLL LOCKARD, President, Maryland Medical and Chirurgical Faculty; DR. LOUIS H. DOUGLASS, President, Baltimore City Medical Society; DR. WM. J. F. WARTHEN, Baltimore County Health Officer; DR. VICTOR F. CULLEN, Superintendent, Maryland State Sanatorium; DR. W. A. BRIDGES, Superintendent, Eudowood Sanatorium, Towson, Maryland; DR. A. J. LANZA, Chairman, Medical Committee, Industrial Hygiene Foundation; Associate Medical Director, Metropolitan Life, New York; DR. FRED J. WAMPLER, Medical Director, Rustless Iron and Steel Corporation, Baltimore; JOHN S. STANLEY, Secretary, Maryland Self-Insurers' Association; MARGARET ALLEN, R.N., Supervisor of Nurses, Eastern Aircraft and Chevrolet, Baltimore Division, General Motors; YVONNE DU BOIS, R.N., Chairman, Maryland State Industrial Nurses' Association; R. E. WALDO, Director of Personnel, Eastern Aircraft Division, General Motors, Linden, New Jersey; G. HARRY POUDER, Executive Vice-President, Baltimore Association of Commerce; JOHN T. MENZIES, President, Baltimore Association of Commerce; DR. JOHN V. HOPKINS, Surgical Director, U. S. Fidelity and Guarantee; DR. THOMAS P. SPRUNT, Acting Professor of Medicine, University of Maryland School of Medicine; DR. ARTHUR M. SHIPLEY, Professor of Surgery, University of Maryland School of Medicine. There were also local guests to the number of nearly 300.

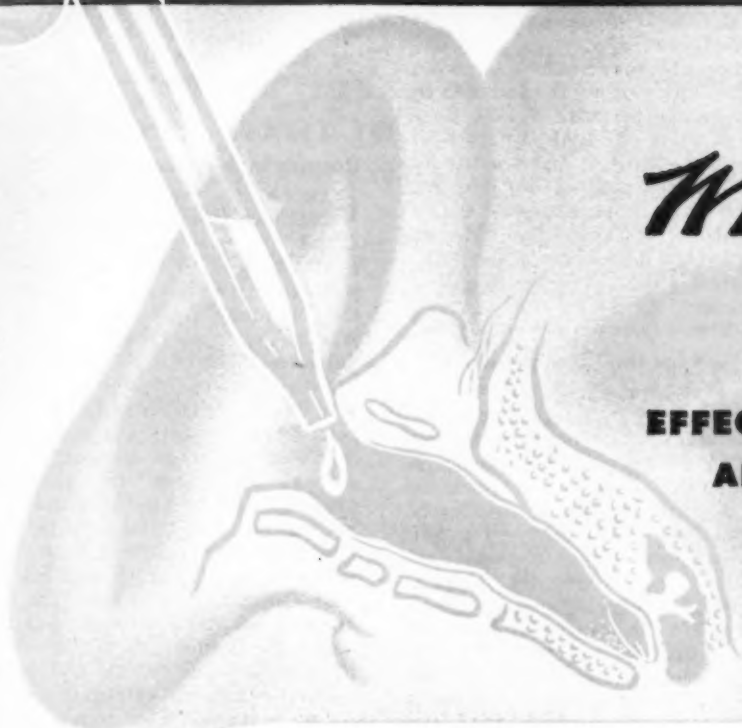
Wisconsin Spring Clinics

WISCONSIN Medical Society's Council on Scientific Work, in cooperation with the medical societies of Eau Claire, Portage, Outgamie and Milwaukee counties, announces a Spring Clinic program to be given at Eau Claire, May 8; Stevens Point, May 9; Appleton, May 10, and Milwaukee, May 11. The subjects and speakers: C. O. SAPPINGTON, M.D., DR.P.H., Chicago, on "Industrial Med-

—*Continued on page 344.*

MORE EFFECTIVE LOCAL CHEMOTHERAPY for Common Ear Infections





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FORMULA:

Carbamide (Urea)	**10%**
Sulfanilamide	**5%**
Chlorobutanol (anhydrous)	**3%**
Glycerin (h.sp.gr.)	**q.s.**

Advantages of Combining Carbamide with Sulfonamide:

1. Chemically debrides lesion by solvent effect on necrotic tissues.
2. Renders sulfanilamide effectively antibacterial even in the presence of pus.
3. Solubilizes sulfanilamide, effecting higher tissue concentration and increasing diffusibility through living and dead tissues.
4. Non-irritating to living tissue.

Advantages of Chlorobutanol:

Therapeutically compatible with sulfonamides, this recognized, local anesthetic provides effective analgesic and antipruritic properties.

Indications: Local management of suppurative and non-suppurative otitis media, and of sulfonamide-susceptible infections of external auditory canal.

White's Otomide is available in dropper bottles of one-half fluid ounce (15 cc.).

IMPORTANT: Please note that your patient requires your prescription to obtain this product from the pharmacist.

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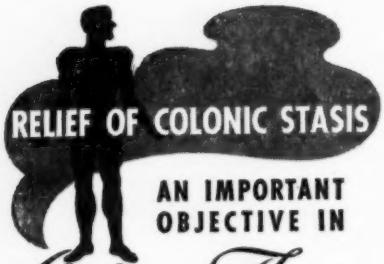

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COMMENT and OPINION

Sweating It Out

MEASUREMENT of palmar sweating has, in the opinion of two U. S. Army medical officers, a direct bearing on fitness for military service. Among more than 1,000 patients studied, intense response invariably indicated emotional strain or a disturbance of the autonomic nervous system. The part of the palm to be tested is painted with a 25% alcoholic solution of USP tincture of ferric chloride, dried and pressed for three minutes against dry blotting paper previously impregnated with a 2% solution of tannic acid. The intensity of the dark stain on the paper is a precise index of the amount of sweating.

—*Modern Medicine Topics*, March, 1945.

No Need for the "Hush-Hush!"

IRA MOSHER, president, National Association of Manufacturers, says "If industry, which has been responsible for its share of the jobs heretofore in this country, and which has been a prime mover of prosperity, is not allowed to prepare for V-E day and for eventual peace, the penalty of unpreparedness, which is failure, will be paid not only by industry, but by society as a whole. To say that we may not think or talk of reconversion now is to sentence us to a peace-time default in our responsibilities which might put the whole economic system in the hands of government. Such a sentence would disestablish us in advance. Therefore, let us get busy on our preparations for reconversion."

"The Certificate or Else"

WAR workers who, in the face of the critical manpower shortage in war industries attempt to cover up an unjustified absence from work by alleged illness or who try to obtain better jobs on the pretext of illness are flayed by the *J.A.M.A.* in a recent editorial which urges every physician to assure himself of the merit of each medical certificate before he issues it. . . . If medicine is socialized, continues the editor of *Philadelphia Medicine*, the doctor will be an employee of government, a political jobholder, and subject to all the petty crookedness of petty politicians, of whom we have too many. Refuse a voter a certificate under such conditions! One might just as well be ready to retire from the practice of medicine and all hope of ever again making a living. One can picture the discomfited voter rushing from the doctor's office to his ward leader and the latter directing the physician to produce the certificate or else. Actually the political pressure put upon the doctor might be a bit more subtle than a direct order, but, regardless of its form, the medico would know that he had no choice but to comply, unless he was tired of eating. Is it likely that Mr. John Q. Public would want political doctors subject to all the whims of political racketeers if he understood all the facets of socialized medicine? Now more than ever before we doctors must keep pounding at the truth until the people do understand what socialized medicine will mean to them.

—*Pittsburgh Medical Bulletin*, February 10, 1945.

Danger in Surplus Drugs

RELEASE on the open market of surplus war supplies of potent drugs and medicines represents a grave menace to the public health, comments the Board of Control of the National Wholesale Druggists' Association. As evidence of the dangers involved, E. Allen Newcomb, secretary of the association, said that, after World War I, a considerable quantity of ether which had deteriorated to the point where it was condemned for anesthetic use was sold by the government to sources outside of the drug industry and later found its way into hospitals where it was blamed for several deaths. He also said that on a recent visit to a storage depot he saw several thousand bottles of hydrogen peroxide which had evaporated to such an extent in government storage that some of the bottles were only half full of liquid. As another instance, he cited iodine, in which similar evaporation would reduce the quantity of the solvent in the compound and expose the user to the danger of burns. Under present procedure drugs are sold by the government to the highest bidder, and the only protection to the public health is the label on the goods, which may be considerably out of date.

DDT Toxicity

STUDIES conducted at the Industrial Hygiene Research Laboratory of the National Institute of Health, Bethesda, showed that DDT in concentrations up to 10% in inert powders, for dusting clothes, as in the extermination of lice, offers no serious health consequences. The use of a 1% DDT deobase mist mixture had no toxic effect on rabbits, and it should be safe to use as a fly spray. In a clinical and laboratory study of three men who had had several months of continuous occupational exposure to DDT in its various forms as an insecticide, an evaluation of results failed to indicate any definite toxic effects from exposure to DDT. Inhalation studies of the toxicity and potential dangers of aerosols, dusting powders and mists containing DDT has been made at the Laboratory on mice, rats, guinea pigs, dogs, monkeys and human beings. These experiments revealed a

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His preference for wet dressings solution is **Domeboro Tabs** ("widely used in industry", particularly by Parkes[2] at Curtiss Wright for cutting-oil dermatitis)—because it is "a convenient tablet which, when dissolved in water, releases a *lead-free aluminum acetate in appropriate dilution,*" with a substantial percentage of boric acid.

The *crude coal-tar paste* used at New York University, according to Combes, "is manufactured commercially under the name **Daxalan**"—which has been found *superior to distillates, filtrates and pastes containing liquor picis carbonis.*

It must be properly applied for "optimum benefit", and Combes advises thinning with **Domolene** for spreading over a large area—because in his judgment its hydrophilic ointment base "does not materially lessen the therapeutic efficacy of the paste."

With tissue repair under way, and only erythema remaining, the use of **Domeboro Ointment** (each ounce of which, in a special hydrophilic base, possesses the therapeutic action of one Domeboro Tab diluted in a pint of water), permits a quicker return to work, while healing is promoted by its efficient topical action.

(1) Combes, F. C.: Indus. Med., July, 1944.
(2) Parkes, Morey: Indus. Med., January, 1944.

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marked difference in the susceptibility of different animal species to DDT. Mice were more susceptible than rats, guinea pigs and rabbits, with monkeys and dogs, most resistant. Only when relatively large doses were ingested or absorbed through the skin did toxic reactions set in, such as tremors, "jumpiness" as in strychnine poisoning, convulsions with death, fatty degeneration of the liver and kidneys or changes in the nerve structure. In experiments with dogs, daily insufflation of 100 mg. of pure DDT per kilogram of the weight of the animal caused definite signs of poisoning in only one out of the three animals tested, after a period of 18 days. Although the study dealt only with the appraisal of the potential dangers of DDT when inhaled as an aerosol, dust, or mist, massive doses either by mouth or by skin absorption will cause toxic reactions. Heavy contamination of foods should be avoided. Despite the inherent toxicity, the use of DDT in 1 to 5% solutions in 10% cyclohexanone with 85 to 95% Freon, as aerosol, should offer no serious health hazards when used as an insecticide.

—PAUL A. NEAL, Federal Security Agency, before National Museum Entomological Society, Washington, November 2, 1944, as reported in *Chem. & Metl. Eng.*, February, 1945.

Doctors Can Help

VIGOROUS efforts have been initiated in Ohio by the War Manpower Commission to keep workers, especially those in critical war industries, on the job so production can be increased and larger quantities made available for the armed forces. Absenteeism constitutes a serious problem in some areas of the state. The reasons given by some workers for being off the job are sound and reasonable. This is not true in other cases. It is a known fact that some workers stay off the job when only slightly indisposed; others on the pretense of being ill. Physicians can help a lot in keeping absenteeism at a minimum by encouraging patients with only trivial ailments to stay on the job. Obviously, sound medical judgment must be exercised and those whose condition would be aggravated by working should be told to stay at home. Also, physicians should refuse to sign sickness blanks in those cases where the worker is merely using "sickness" as an excuse to stay off the job. Naturally, such cases present a real problem for the physician. Nevertheless, increased production is essential for early termination of the war, so the physician will have to be absolutely honest with himself, his patients and the entire war effort. Matters of convenience can not be tolerated under present conditions. The physician owes it to himself, the entire profession and the public to be fearless even in the face of criticism by some of his patients.

—Comment, in *Ohio State Med J.*, February, 1945.

Pass the Kleenex

THE medical profession has been the goat at the tail end of a wide variety of alleged humor regarding the prevention and treatment of the "common cold." On examination of the mortality statistics from the common cold in actuarial records, we find it exactly point zero, zero, zero per 100,000 population, which is the same mortality rate obtained from hitting the thumb lightly with a hammer while hanging a picture (also unpreventable). The individuals who should be blamed (if there is any blame) are the ones who have the cold in the first place, because they usually wait from four days to six months from the onset of the weeping proboscis before they decide to call a doctor. Someone is always quoting figures about the number of days lost in industry due to the common cold and they expect us to believe it. A better alibi for not going to work should be thought of pretty soon as that one has long gray whiskers. A "bad cold" covers a multitude of sins, male and female, and when industry reports millions of man-hours lost due to the common cold, you can well add considerable salt and then divide by 50 and the figure might sound more interesting. It is stated that most colds "run their course" which usually means, after the patient has exhausted all home remedies including the numerous types of ancestral poultices and herbs, he then consults the corner druggist who in a period of several days may run the gamut of pharmaceutical coryzal therapeutics and eventually, in desperation, the patient is advised to see a doctor. Many colds are associated with sinu-

WITH OUR COMPLIMENTS

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sitis which is a much deeper and more stubborn infection; others are associated with bronchitis, nasal polyps, or tonsillar disease. Another item of importance is that the great increase in the number of persons who smoke has not helped to decrease the number of upper respiratory diseases, because no matter what the advertisers of certain cigarettes may say regarding the non-irritating effect of smoking, it has considerable to do with the onset and course of upper respiratory diseases. Contrary to the general opinion, most "colds" are not acquired by direct contact but are the result of exposure of certain susceptible parts of the body to drafts, low temperatures and moisture with resultant vaso-constriction of the nasopharynx. This in turn causes lowered local resistance of the mucous membrane surfaces followed by the classical symptoms of the common cold and the drippy schnozzola. Perhaps the future will produce a vaccine from a draft of air so that one may begin by injecting one-tenth of a cc. and gradually work up to a full zephyr. This resembles somewhat the more recent attempt to treat arthritis with bee venom by beginning with one tenth of a sting and gradually working up to a full sting. The patient may get stung, however, in both instances.

—J. J. L., Editorially in *Detroit Medical News*, February 5, 1945.

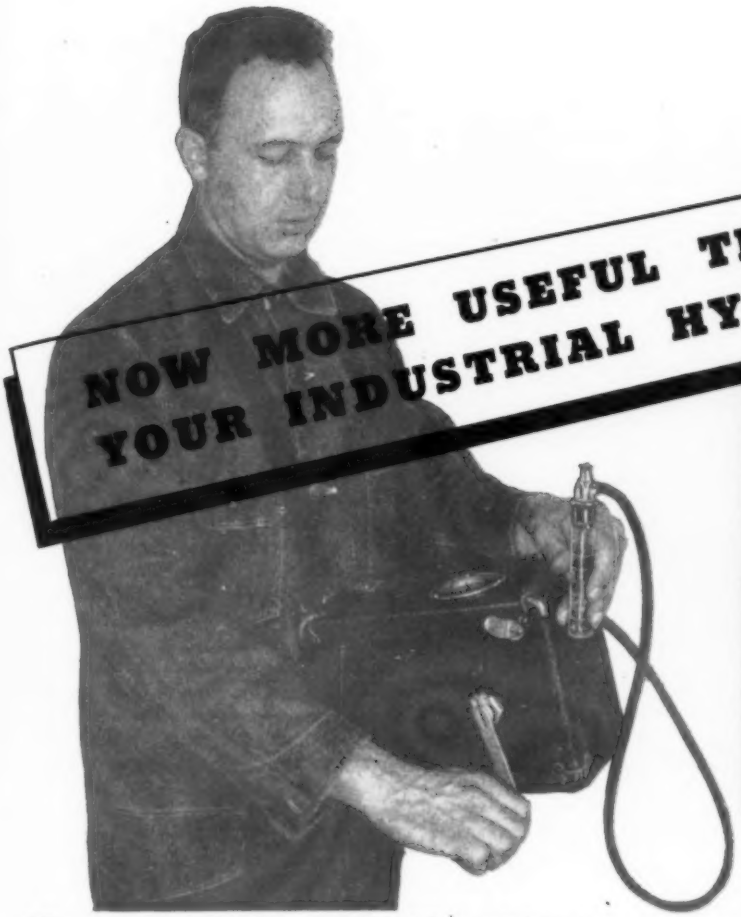
Win the War First

WASHINGTON is watching with great interest the developments in California, where Governor Warren is urging a system of Compulsory State Health Insurance. Also in New York, where the CIO has introduced a State Medical Care Bill. It is predicted that Washington will be closely watching state results before jumping into Federalized medicine. Senator Vandenberg has introduced a resolution calling for a thorough study of the Social Security Act, the report to be submitted by October, 1945. This may mean that no Senate hearing or action will take place during the interval on legislation concerning social security. Democratic leaders say that the subject of health insurance is not being discussed for the present. Manpower—war—foreign affairs, are too important for any interference by domestic post war problems. The President will give the signal when the proper time arrives, by a message to Congress on the subject. Congressmen are very busy attending committee meetings. There is an air of genuine seriousness wherever you go. Congressmen from all sections of the United States have toured the battlefronts, have received a great deal of confidential information pertaining to the war's progress, appear to be closer to their constituents than in former sessions. Many have lost sons in battle.

—*Connecticut State M. J.*, March, 1945.

The Fort Greene Plan

IN FORT GREENE Park stands a monument to American prisoners of the Revolution, who suffered disease and death in the old prison ship Jersey. The industrial and medical forces of that district started last year a movement that will make the Fort Greene Health district a monumental leader in all the cities of the country. This area of 200,000 is more industrialized than any other in Brooklyn. Under the chairmanship of Reginald E. Gillmor, president of the Sperry Gyroscope Company, and co-chairman Louis Hollander, manager of the New York Joint Board of Amalgamated Clothing Workers, a committee was organized last year of leading citizens, representatives of various industrial firms, and eminent physicians and social workers. The first annual report has just been issued. The problem of workers' health is exceedingly important, and the cooperation of the manufacturers and the workers themselves must be solicited. The district aside from the Navy Yard, includes makers of instruments, war industries, tools, clothing, besides laundries, bakeries, meat distributors, candy factories, public utilities, department stores and office buildings. The chief method of informing the workers on their own health problems is through the issue of a semi-monthly tabloid, which is put in the hands of 90% of the workers in the cooperating firms. Together with this, which is read both by the workers and their families, posters on various health methods are issued, and committees are formed in each of the plants for



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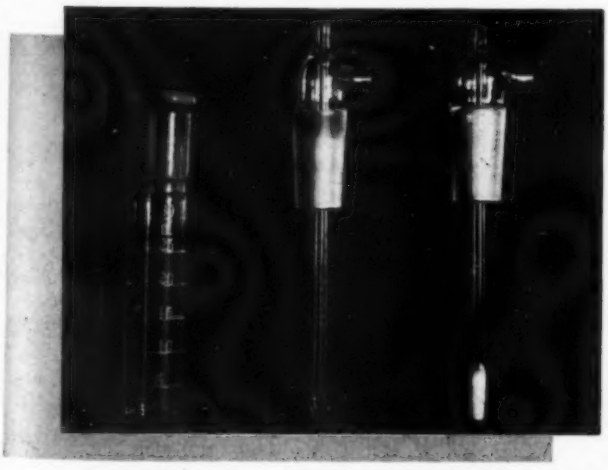
Fundamental in modern industrial hygiene programs, the M.S.A. Midget Impinger is an accepted, dependable air sampling instrument. It is light in weight, hand-operated, and requires no connections to batteries or external power sources. Write for complete details in our latest Bulletin No. CT-6.



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stimulating interest and helping to supervise health conditions. Movies on several features of the campaign are also given. Industrial nurses are located in various factories and districts, and x-ray tests for heart affections are made. Later blood tests will be a feature. A careful census is taken of the incidence of the big causes of death, cancer, pneumonia, heart disease, infant mortality, and accident and tuberculosis, and all kinds of information are dispensed on diet and treatment of minor ailments. Medical care is also given in many plants. This Fort Greene Health Committee will be the precursor of many such organizations throughout the country, for good health is not only an asset to the one who enjoys it, but also to his home, his neighborhood, the business where he works and to the whole general community. The committee is to be highly recommended for this notable work.

—*Brooklyn, New York, Citizen*, March 23, 1945.

Who Said It?

THE CREDULOUS PEOPLE: " 'The ruin of democracies is the credulity of the people when faced with demagogues who flatter and mislead the multitude. When he (the demagogue) gets into the saddle, spies and informers are his principal instruments. War is his favorite occupation, for the sake of engrossing the attention of the people and making himself necessary to them as their leader.' The man who said this was Aristotle, and he lived 2300 years ago." (HOWARD VINCENT O'BRIEN, in *Chicago Daily News*). . . . SECRET DIPLOMACY: "Now that some of the deals arranged. . . . by governments without knowledge of their people are beginning to come out, the old outcry against 'secret diplomacy' is being revived. The best comment on the subject is this: 'It has been the one song of those who thirst after absolute power, that the interest of the state requires that its affairs should be conducted in secret. . . . But the more such arguments disguise themselves under the mask of public welfare the more oppressive is the slavery to which they will lead. . . . Better that right counsels be known to enemies than that evil secrets of tyrants should be concealed from the citizens, as they who can treat secretly the affairs of a nation. . . . plot against the enemy in time of war, so do they against the citizens in time of peace.' Who said it? The great philosopher, Spinoza, about 300 years ago." (O.S., in *Chicago Tribune*).

The Bad Odor Problem

BAD ODOR, a nuisance with which the industrial hygiene unit often is called upon to cope, may present a difficult problem to the engineer. Recent successful experience with the activated carbon method is presented here as possible guidance. Odors due to the handling of styrene and various acrylic esters in the Industrial Building of the National Bureau of Standards, Washington, D. C., led to numerous complaints and finally forced suspension of the process. Engineers of the Industrial Hygiene Division, U. S. Public Health Service, were called in, investigated the problem, and worked out a method of control. Operations with the odoriferous substances are to be confined to two sections, inside a booth or chemical hood, each section to be fitted with counterweighted vertical sliding glass doors and equipped with exhaust ventilation at the approximate rate of 150 cubic feet of air per minute per square foot of hood space. Objectionable odors will be absorbed by activated charcoal. This method is recommended by the Industrial Hygiene Division for cafeterias, hospitals, and some industrial processes, under certain conditions, especially where recirculation of air is a part of the ventilation system. Economy is a factor, since the saving of heat, especially in the North, soon pays for the installation.

—*Industrial Hygiene News Letter*, February, 1945.

Confusion

SECRET: "If your mammy done told you there are two (2) sexes—

—*Continued on page 348.*

A NOTABLE PRODUCTION ACHIEVEMENT

Copies of this up-to-date chart, containing the essentials of Penicillin therapy, are available on request.

THE record performance of Penicillin manufacturers in achieving large-scale production has resulted in the fulfillment of current military requirements for this remarkable antibacterial agent. Penicillin Sodium Merck now is available to the medical profession for the treatment of civilian patients, having been released by the War Production Board for general distribution through customary supply channels.

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Benign Pneumonoconiosis

EUGENE P. PENDERGRASS, M.D., and SINION S. LEOPOLD, M.D., "Benign Pneumonoconiosis," in *Journal of the American Medical Association*, 127:12, 701-705, (March 24) 1945. Summary: "To the list of the benign pneumonoconioses previously recorded we are adding four cases of siderosis occurring in metal grinders. In this group silicosis has been excluded by eliminating significant exposure to free silica. This has been achieved by knowledge of the composition of the metal ground, by being informed of the nature of the abrasive wheels used, by personal inspection of the plant and by the report of an industrial engineering survey. We know of one other example of benign pneumonoconiosis resulting from the inhalation of a different metal and it is predictable that, as knowledge of this condition grows, many other instances of benign pneumonoconiosis from metal processing and other industrial operations will be added to this group. It is impossible to differentiate the roentgen appearance of nodulation of silicosis or the pseudonodulation of benign pneumonoconiosis from the shadows cast by many pulmonary diseases unassociated with the inhalation of dust. The diagnosis of the pulmonary lesions in such circumstances depends on the collaboration of the internist, the roentgenologist and the laboratory technician. To differentiate between silicosis and benign pneumonoconiosis one must have a detailed knowledge of the occupational history, the environmental conditions of the worker and the precise information regarding the nature, concentration and particle size of the dust to which he is exposed. Advanced silicosis is usually disabling and, when complicated with tuberculosis, it is fatal."

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The Term "Psychoneurosis"

LIEUTENANT COLONEL JACKSON M. THOMAS, M.C., A.V.S., Associate in psychiatry, Harvard Medical School, and superintendent, Channings Sanitarium, Wellesley, Massachusetts (on leave of absence), "The Use of the Term 'Psychoneurosis,'" in *New England J. Med.*, 232:5, 122-125, February 1, 1945. Extracts: "From a psychopathologic point of view, the psychoses that I have seen in this war have not differed from those observed in a busy psychopathic hospital in peacetime, except in the subject matter of the delusions and hallucinations, which vary, as they have throughout the ages, with the contemporary topics of preoccupation. This statement holds true for that group of cases regarded as acute schizophrenias, which some psychiatrists think are peculiar to this war. These cases, characterized by short periods of confusion, transitory delusions and hallucinations and quick recovery soon after admission to a hospital, are closely similar to the clinical states of emotional turmoil to which Campbell often called attention. They vary from the latter only in that the subject matter of their pathologic beliefs is more often concerned with factors prevalent in a man's thoughts in time of war. The way the patient deals with these factors, however, in war or peace, depends on the same mental mechanisms that the normal mind utilizes in adapting itself to any condition of stress. The practical disposition of psychoses in the Army is clear-cut. Experience has shown that the majority of these patients should be discharged from the service. Some of the psychoses instigated by infective and exhaustive states, which clear up when the organic, debilitating processes subside, are exceptions to this general policy. A widespread misuse of the term 'psychoneurosis' in the present war has made the treatment and disposition of cases placed in this diagnostic classification more complex than that of the psychoses. Some of the difficulty is due to the fact that the psychiatrist is too often unfamiliar with the life of a soldier in the field. Imbued with theories of abnormal human behavior, remaining within the wards of a hospital and feeling the necessity to fit every record into the prevailing order of a psychiatric system, he runs the risk of confusing signs of boredom, homesickness, reactions against discipline and the normal apprehension that many excellent soldiers experience before going into battle with symptoms of a true psychoneurosis. The borderline between normal reactions to difficult situations and emotional states that are to be regarded as symptoms of an ominous personality disorder is sometimes a narrow one. Human nature is not a stand-

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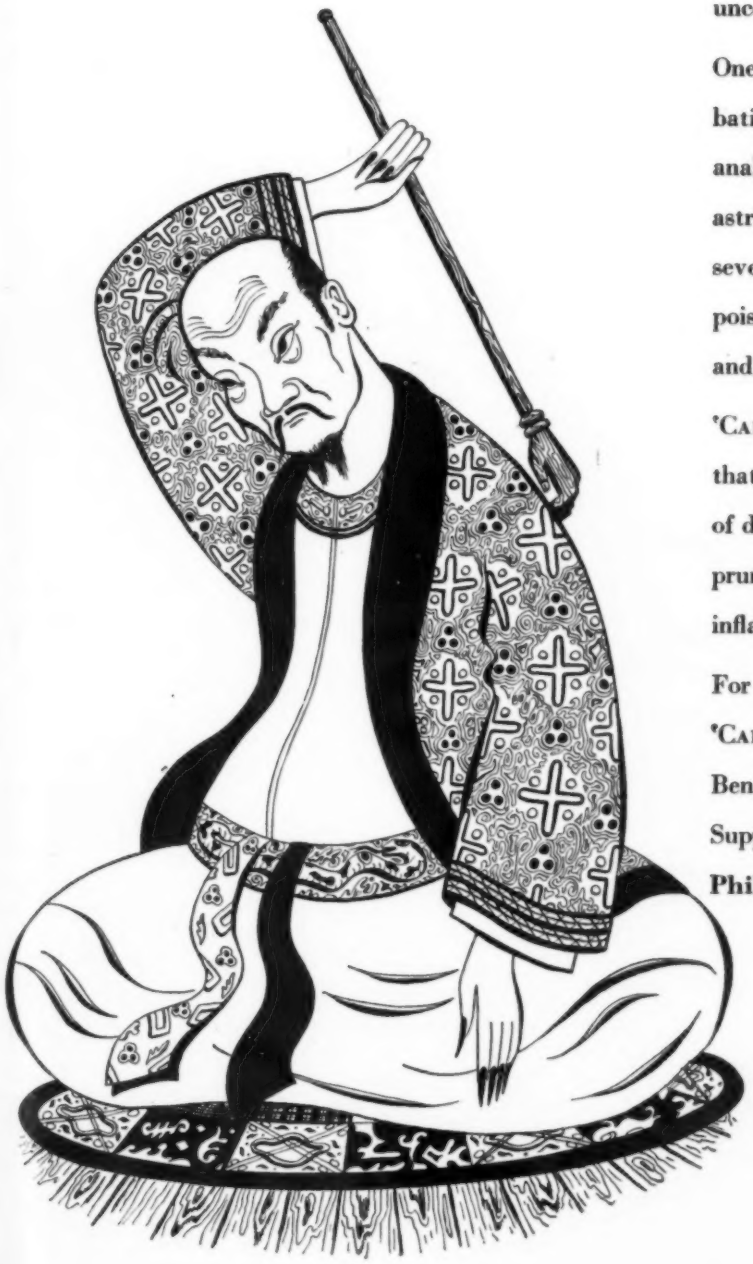
ardized affair. Normal men differ in their output of energy and in their medium of self-expression. Some are more sensitive than others in dealing with their diverse inner needs and with the complex demands of military life. . . . I saw patients in England, members of the Air Force, who were in combat over the Continent and others who had not been in combat, and considered them unsuitable for further duty. They were returned to the United States with a diagnosis of psychoneurosis. Before they arrived, I was ordered to report for duty at the same hospital to which they were later admitted. Re-examination of some of these patients disclosed that a remarkable improvement had taken place in them, especially in those who had not been in combat. This observation opened my eyes wider to the haste that I had been guilty of in the use of the term 'psychoneurosis.' In some cases I had mistaken boredom, homesickness and what the British call 'morale lesions' for symptoms of a nervous disorder. Recent use of the word 'anxiety' illustrates further how muddled is the present knowledge of the psychoneuroses. There are psychiatrists who regard the familiar fear of a soldier in a dangerous situation as a measure of the emotion of an anxiety neurosis. This is tantamount to calling all frightened and bewildered soldiers psychoneurotic. There was a time when 'anxiety' was considered an appropriate word for the emotion present in clinical states characterized by palpitation, dyspnea, sweating, anxiousness and apprehension. Of late, however, this word has been used so loosely that it has almost acquired buoyant and ethereal qualities. This careless use of the term does injustice to the Army, the soldier and the taxpayer. So does the term 'depression' when it is applied to simple nostalgias. These latter conditions were often seen in World War I. When the cause, which was absence from home or some factor related to it, was removed, the patient promptly recovered. Salmon cited cases who recovered on the voyage home, some doing this so rapidly that a suspicion of malingering arose. Similar recoveries are being seen in the present war. They should allay the fears entertained with regard to some of the erroneously classified psychoneuroses. It may be argued that a disappearance of anxiety and insomnia under the conditions cited does not constitute a cure, and that the unconscious must be exposed to remove the real trouble. This point of view may be correct for some true psychoneuroses. The tension and anxiety of the cases discussed here, however, seem to have arisen from obviously trying situations rather than from hidden conflicts. If the reactions under discussion are to be excluded from the psychoneurotic group, it is in order to ask what name is to be given them. The idea that an emotionally upset soldier is not a particular example of a recognized disorder is disturbing to some psychiatrists. Nor does modern warfare permit the outlet that Joshua seems to have had before the siege of Jericho, when it was directed that 'the fearful and faint-hearted return unto his home lest his brethren's heart faint as well as his heart.' No one who is familiar with the fleeting fashions in psychiatric nomenclature wants to be caught adding another term to the confusion. Moreover, it is obvious from what has been said that I believe that some of these cases present problems in morale, discipline and stamina. If this is so, it follows that any term connoting a mental disorder will cloud the issue. The answer to the question seems to rest in the prophylactic orientation program now under way — the prevention of states that require a stigmatizing name."

Preventive Medicine

DR. J. T. CORNELIUS, M.A., M.P.H., (Johns Hopkins), Ph. D. (London), Professor of Bacteriology and Hygiene, Missionary Medical College, Vellore, "Preventive Medicine," in *Journal of the Indian Medical Association* (Calcutta), October, 1944 (14:1, 10:13). Extract: "SOCIAL MEASURES: The new science of preventive medicine would stress the necessity for a periodic medical overhaul of every man, woman and child in order that the health assets and liabiilties of each individual might be correctly assessed and a plan of living could be prescribed according to his or her health needs. Sir Arbuthnot Lane has made a very strong case for periodical medical examination in his book entitled 'New Health for Every Man' published in 1932. To this end, health centres or what I would prefer to call

the Chinese Back-Scratcher is out of date . . .



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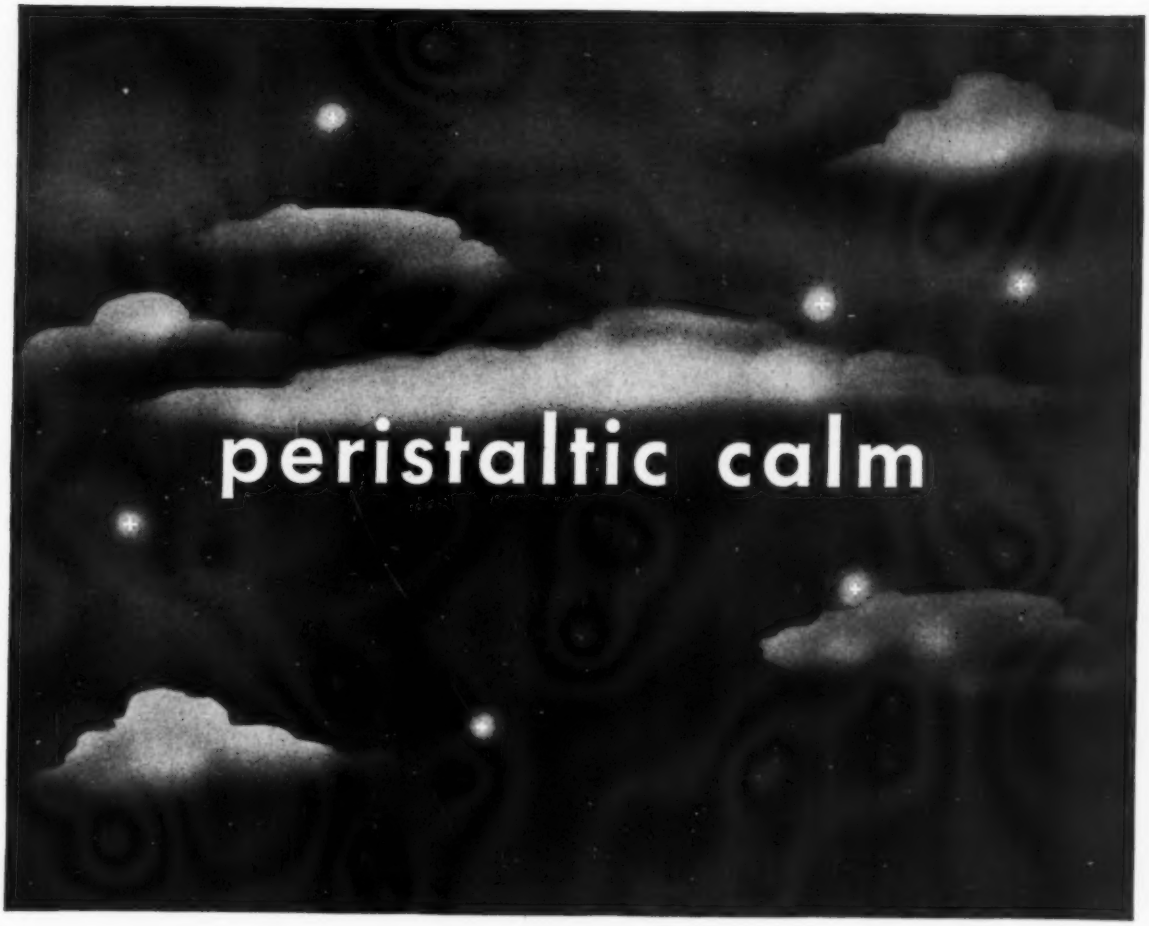
'Preventoriums' should be established as a department in every large hospital or by a group of doctors in every large city for the thorough periodical medical examination of all persons who are willing to pay the required fees. At the preventoriums, a careful inquiry should be made into the family history to ascertain the hereditary constitution of the individual and into the personal history with an account of past illness to determine the immunity status and habits, and a physical and a clinical examination with necessary tests should be undertaken to determine (1) the nutrition status, (2) the condition of the organs and of ductless glands and their functions, and (3) the state of the secretions and excretions of the body. Medical history of each individual examined comprising the above data should be kept for future reference and as permanent records. Preventive treatment and advice to those requiring it should be given. The establishment of such preventoriums in this country will open a new field in the prevention of diseases and the centers will function as effective agencies for prolonging life and adding to the efficiency and health of the individual. Insurance companies should require all the insured persons to submit to a periodic medical examination at approved preventoriums. This measure will prove to be a real economic value both to the individual and insurance companies. Indeed such a privilege should be claimed as a right by the insured public. Financial support to such preventoriums should be forthcoming from workmen's associations, cooperative societies and employers of labour, in addition to the support from insurance companies. I am confident that all these organizations will find periodic medical examinations at the preventoriums a paying proposition."

Head Injuries

DR. S. R. SNODGRASS, Galveston, "The Treatment of Closed Head Injuries," in *Texas State J. Med.*, February, 1945. Extract: "Return of consciousness usually assures recovery. Medication may be required for the relief of headache and at times lumbar puncture is useful for that purpose. Our practice has been recently to allow the patient to sit upright and to get out of bed as soon as he expresses a wish to do so if we believe his physical strength is adequate for this purpose. We have noted no increased incidence of post-traumatic headache and dizziness by allowing patients to become ambulatory earlier than formerly. We believe that it is undesirable to make the patient so conscious of the brain injury that he becomes apprehensive concerning the possibility of future disability. Post-traumatic complaints have never been observed in children by us and they have been most common in severely injured middle-aged or elderly individuals whose occupations require considerable physical activity. During the last six years 171 patients with acute head injuries have been under our care at John Sealy Hospital; 18 deaths occurred. Three of these deaths occurred in patients who had recovered consciousness: one was associated with rupture of the jejunum which was not diagnosed early but which was submitted to operation; one occurred a few hours after treatment of multiple compound injuries; and the third occurred five months after injury and was caused by infection in compound skeletal injuries. None of the remaining patients recovered consciousness and died in periods ranging from two hours to several weeks after hospital admission. It is our belief that there is at the present time no specific form of treatment available for closed head injuries. The possibility that these patients may develop intracranial hematomas should constantly be kept in mind. Measures directed at support of the patient's general condition and to prevent, in so far as possible, the more common fatal complications, appear more rational than preoccupation with controversial details. The patient's recovery is usually assured by the return of consciousness."

The Attitude of Labor

DR. ERNEST E. IRONS, Chicago, "Epochs in Medicine—The Improvement of Medical Service to Labor," in *Journal of the American Medical Association*, 127:11, 621-624, March 17, 1945. Extracts: "In past years medicine has found difficulty in getting even a conference with responsible labor leaders, notwithstanding the unquestioned importance to labor of the medical questions requiring discussion. Approaches were often made through management, which no doubt



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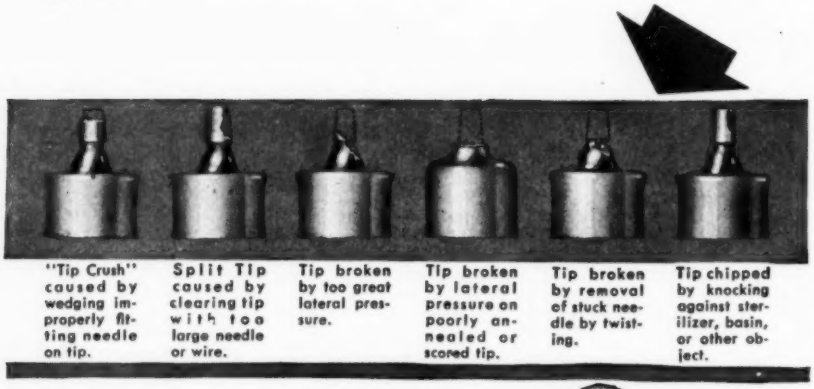

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at once initiated distrust by labor. Cogent questions of measures to prevent exposure of shop employees to contagious disease of their sick colleagues, and more recently the cooperation of labor in industrial preventive medicine, first urged by physicians with a view to the protection of labor, have required much explanation before labor could be convinced of the overall desirability to labor of the measures proposed. Too often also the quality of medical care afforded labor by management in the early days did not inspire trust in the good faith of employers. More recently, conferences have been held with labor and management concerning problems of physical fitness for specific operations in industry. As soon as labor representatives were assured of the sincerity of medicine, their resistance to conferences decreased. This is most encouraging. The holding of future profitable conferences will result in more complete understanding. Medicine has no 'ax to grind'; medicine knows no class in providing its art and skill to the care of the sick. The attitude of labor to socialized medicine is thus explainable by lack of information and possibly also by the use of the word 'social,' which has too often been loosely interpreted as having the connotation of 'something desirable that we haven't yet got.' If in place of socialized medicine there was substituted 'government controlled medicine' the whole picture would be less attractive. . . . One of the most serious effects of the taking over of the practice of medicine by government as provided under proposed legislation will be the loss of personal, local, county and state responsibility and the substitution of a central governmental bureau. Already innumerable Washington bureaus seem to have taken over even legislative functions in that they are said to write 90% of the bills passed by Congress; then under broad permissive provisions they undertake the functions of the federal judiciary and prosecute citizens for violations of laws which they themselves originated. Federal subsidies, some of which are beneficial to the nation as a whole, are in other cases made the instrument by which the will of a bureau is imposed on states and local communities. This system forces the sale of states' rights to a Federal bureau for the price of a government subsidy. This system will accentuate rather than decrease existing social injustices and tend toward totalitarian government, which in Germany eventuated in the attempt to rule the world and is now engulfing her in disillusionment and misery."

The "Psychoneurotic"

EDITORIAL, *New England Journal of Medicine*, March 8, 1945: "Sometime sportswriter Bill Cunningham has acquired new stature as he has found new fields in which to try his strength. In the January 21 issue of the *Boston Herald* he took his fling at the stubbornly cherished belief that a diagnosis of psychoneurosis, particularly when it has been applied to a soldier, constitutes a stigma denoting mental deterioration or moral weakness. Grave injustices are being done to many thousands of innocent and capable young men who are being prejudiced in their opportunities to re-enter industry and normal civilian life, and it is at least partly the job of the country's doctors to educate the public to a better understanding of the profession's more commonly used terminology. To the lay mind, apparently, any word containing the root 'psycho' (from the Greek, meaning soul; derived from the word Psyche—a lovely maiden with wings like a butterfly) implies organic disease of the soul or mind, in other words, insanity—and there seems to be no doubt in Greek mythology that Cupid was crazy about Psyche. The shell shock of World War I, which was an induced psychoneurosis, was considered to have been brought about by physical forces and consequently was an illness that respectable soldiers could have. The same forces, acting on the mind by more subtle agencies than violent ethereal disturbances, place their victim in the ranks of the untouchables, distrusted by industry and frequently held in contempt by friends and family. The polite term 'battle fatigue,' which has been offered as a substitute for the quasi-scientific psychoneurosis, suggests the warrior worn out in the defense of his country—hence, an acceptable hero, worthy of sympathy and help. A literal-minded medical corps apparently did not realize the trouble that could be caused by the unguarded classification of disease. Either it underrated the velocity, impact and explosive force of the 'psycho' root, or it overestimated the intellectual capacity of the general public on

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the home front. At any rate, the damage was done, and our hats are off to Bill Cunningham for his discerning effort to undo it. In the February 1 issue of the *Journal*, Lieutenant Colonel Jackson M. Thomas emphasized the distinction between genuine psychoneurotics and many of these soldiers whose emotional stability has cracked after a greater or less exposure to the enormous psychic trauma of combat conditions. (See page 32.) The genuine psychoneurotic, a victim of hidden conflicts, is a person otherwise normal who cannot face certain situations of everyday environment. The soldier with a simple adult maladjustment is a normal person who has passed his limit of reacting normally to abnormal environmental conditions. It must be recognized, moreover, that soldiers thus wounded are often among the finest and bravest that an army produces. The best thing that can be done for them is to treat them like the other sick and wounded, not classifying and grouping them with the psychotic. In closing, it does not seem inappropriate to point out that many of the actions of the average man savor of the psychoneurotic; that some of our most brilliant generals occasionally exhibit lack of self-control; that one of the greatest leaders of the Civil War was forced to give up his command for several months, being sorely beset by doubts; that not only genius but even courage may follow various paths, not all of them obvious to everyone. The breaking point of any substance is determined not entirely by its own resistance but also by the type as well as the degree of force applied to it."

Activities Already Well Organized

DR. L. W. FOKER, Minneapolis, "Changing Attitudes toward Industrial Hygiene," in *Journal-Lancet*, February, 1945. Extract: "Part of the increased attention that has been focused upon industrial health problems, the second of the factors that have given to industrial health its present prominence, has come about through the influence of governmental agencies. These agencies have for a long time recognized its importance; the present war has merely given additional impetus to activities already well organized. During World War I, the U. S. Public Health Service formed a section on industrial hygiene; since that time, industrial hygiene units have been established in 38 states, six cities, two counties, and two territories. Many of the later states to form units have received through the U. S. Public Health Service financial aid from funds made available under Title VI of the Social Security Act. Governmental aid and advice on the national level have thus pointed up the problem and helped stimulate activity toward its solution. At the state level, it is the province of industrial hygiene agencies to assist industry in the appraisal and control of industrial health hazards, through the provision of medical, engineering, and nursing advisory services. Typical of the programs of most such agencies is that of the Division of Industrial Health of the Minnesota Department of Health. Its purposes and functions are: (1) To receive and investigate reports of occupational disease. (2) To promote more adequate medical services within industry, such as the employment of full-time or part-time physicians and nurses, the provision of properly equipped first aid rooms, and the maintenance of sickness records. (3) To encourage the use of ethical preemployment and periodic physical examinations. (4) To confer with industrial physicians in regard to special problems or general industrial health programs. Special blood and urine analyses for evidence of industrial intoxication are done when warranted. (5) To provide engineering personnel who are specially trained and equipped to make studies of plant environment (e. g., air analysis for toxic vapors, gases, and dust, in an effort to determine whether the working atmosphere is safe or otherwise) and to make recommendations for the control of health hazards found. These studies are made at the request of physicians, plant management, the State Department of Labor and Industry, and others concerned with the health and welfare of the industrial worker. (6) To promote within industrial groups adult hygiene programs, such as the control of tuberculosis, syphilis, and other communicable or preventable diseases. (7) To prepare and disseminate information on various toxic materials and processes, and methods for their control. Evidence that such programs have merit and are well received by plant management is the fact that in some states requests for services of the industrial hygiene agency have been so numerous that it has been necessary to

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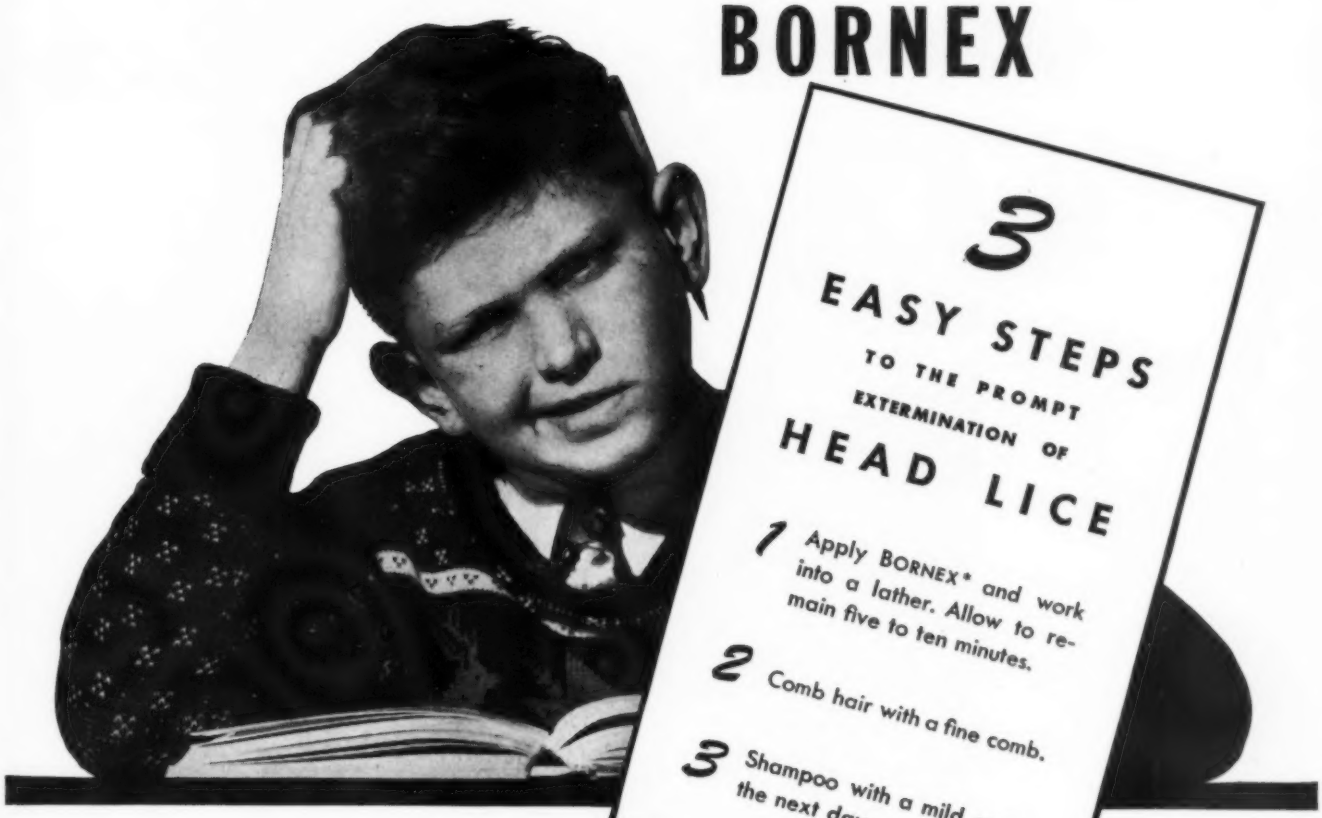

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schedule them several months in advance. Another important factor that has contributed to the augmented attention accorded industrial health problems is the changing attitude of modern plant management. Increasingly, management has come to recognize its responsibility in the protection of the health of the working population. It has also experienced growing awareness of the fact that illness is the greatest cause of employee absenteeism, and so of interrupted production. An additional stimulus to management has been workmen's compensation legislation, with its tendency toward broad coverage of occupational diseases. Various private agencies, such as the National Manufacturers' Association and the Industrial Hygiene Foundation, must be given credit for their part in this movement. Corollary to its growing recognition of responsibility for the workers' health, management is increasingly acknowledging this responsibility through the provision of plant medical programs. This is true for the small plants as well as the large, and it has necessitated the formulation of principles for adequate medical service in plants, principles embodying features that in their essentials are as compatible with a plant service consisting only of an efficient and alert nurse or part-time physician, as well as with more complicated organizations. The American College of Surgeons has tabulated these features of a plant medical service. . . ."

Dr. Frederic A. Besley

DONALD C. BALFOUR, M.D., F.A.C.S., "FREDERIC A. BESLEY—An Appreciation," in *Bulletin of the American College of Surgeons*, 30:1, 85-86, February, 1945. Extract: "As DR. BESLEY became more and more interested in traumatic surgery, he was instrumental in organizing the Committee on Industrial Medicine of the College and served as its chairman for 13 years, from 1926 to 1939. I presume there has been no more important period in the history of industrial surgery than at this time, when the College was lending its efforts to the saving of lives and the betterment of the health of workers. The plans of the committee were welcomed by industry as evidence of the desire of the medical profession to cooperate in working with it toward a solution of their joint problem. The understanding on the part of the workers that employers were interested in their physical and mental welfare, and were willing to secure the best medical advice and act upon it, has helped to clarify the relations between capital and labor and has had much to do with the enormous expansion of industry in this country. DR. BESLEY'S vision was evident at the Conference on Traumatic Surgery at the Clinical Congress in Boston in 1934, when he said: 'It is recognized that this whole subject of industrial medicine and traumatic surgery has many problems and many angles including educational features, financial questions, and, most important, the health, happiness, and contentment of the worker. Social unrest and radicalism are brought about by discontent. Healthy minds and sound bodies are most essential in producing contentment. What could be more conducive to health in individuals by and large than the intelligent care of the mass of workers in industry?' Since one of the most remarkable chapters in history has been the production record of industry in this war, we should comprehend the full significance of the efforts of the College, through the leadership of FRED BESLEY, in establishing the same minimal standards for medical care in industry as have been set up in hospitals. He contributed not only to the surgery of war industry but also to war surgery. His influence was felt in World War I, as General Patterson has pointed out, and among surgeons in the armed services in the present war. Admiral Ross T. McIntire recently has expressed the appreciation of the navy for the cooperation and assistance which DR. BESLEY gave to the naval medical officers."

Research

FROM "The Third Year of the War. Research in Mellon Institute," a summary of the Thirty-Second Annual Report of the director, E. R. WEIDLEIN, for the fiscal year ending February 28, 1945. Extracts: "WHAT IS BEING DONE FOR PLASTICS TECHNOLOGY: The Institute's specialists in plastics have kept on increasing their investigational acquisitions. Their research productivity is indeed both impressive and stimulating. A plot plant for making bentonite plastics has been constructed as an adjunct to the laboratory work. Service tests have demonstrated the utility of new coriaceous plastics in several essential industries. Preformed plastic, developed in a five-year joint program at the Westinghouse Research Laboratories and Mellon Institute, is produced from a mixture of 99% water and 1% wood

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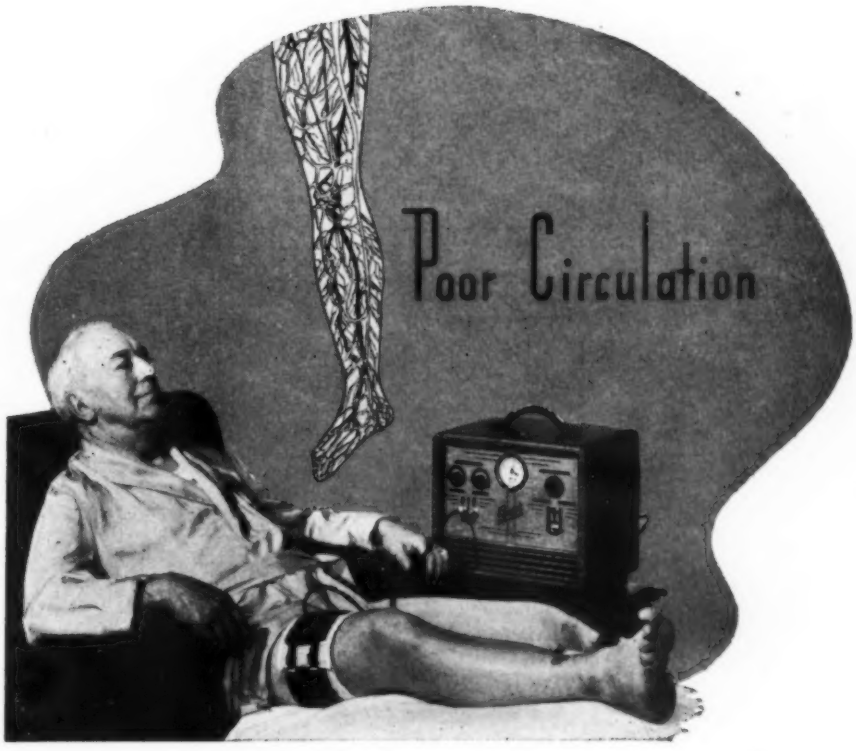
fibers and a phenolic resin, beaten together and then strained by vacuum through a screen to preform to the desired shape, as an airplane wing tip. The wet preform is next oven-dried and molded under heat and pressure. The density can be varied from that of a suberose substance to a strong material resembling hardwood. During the past year an investigation was completed on the reaction of sulfur with olefins. The preparation and control of the nature of the products have been defined and their fields of use have been scanned. Research is continuing on other organic plastics containing sulfur. Allyl alcohol has been studied as an intermediate in synthetic resin production. Much work has to do with processing and utilizing plastics. Precision casting, molding-laminating techniques, and drying are being investigated. Fibrous reinforcing fillers for molding mixtures are receiving study. Other projects relate to new plasticizers. Plastics for lock-nut manufacture have been examined from all aspects. The relative temperature stability of stressed plastics is a concluded research. Another program pertains to the improvement of plastic piston rings and to the development of bearings and bushings fabricated of synthetic resins. The properties of various types of electrical tapes constitute a new investigation and research is being continued on the aging characteristics of industrial tapes. Synthetic waterproof adhesives are being studied for specific purposes. The storage of butadiene and isobutylene was described in publications. A research covered the characterization and utilization of by-product oils resulting from butadiene manufacture from alcohol. The infra-red analysis of butadiene has been dealt with comprehensively. New uses are being sought for styrene. Amines are under trial in compounding synthetic rubber. The chemistry of chicle and other gums is being investigated. Surface-treated pigments prepared by the 'Micronizer' process are proving of interest as fillers in synthetic rubber and as carriers for insecticides. . . . COATINGS CONFORM TO MILITARY MANDATES: Research on 'Vinylite' resin solution coatings has been accelerated to cope with critical problems arising from allocation trends. Suspensions of these resins in organic media have been developed and adapted to the manufacture of battery separators, to metal foil, wire, paper, and cloth coatings, and to the molding of soft rubberlike plastics of many kinds. Improvements have been made in vinyl resin coatings for 'Nylon' and in the use of plastic film in packaging. Protective coatings secured by research are now being widely employed, in army and navy services, to line concrete aviation gasoline storage tanks and airplane wing tanks. One member of the group working in this domain has traveled extensively to supervise the installation of these coatings and to obtain detailed information about the problems encountered. New synthetic resins and resin combinations have been formulated into protective coatings with special properties for steel shell casings, gun barrels, airplane propellers, bomb shackles, food containers, and other war materials. More economical methods of coating formulation have been investigated. Evaluative tests have been started on synthetic resin coatings for use in hot-water tanks and pipe lines. The fellowship has also continued fundamental studies on marine coatings, with particular attention to the prevention of fouling by marine organisms. . . . NEW ORGANOSILICON PRODUCTS: An offspring of inorganic and organic chemistry in combination, the research on organosilicon derivatives has covered much ground excellently in both theory and practice. It has not only captivated scientific, military, and industrial interest, it has engendered and maintained their enthusiasm. The technical glassware fellowship was founded by the Macbeth-Evans Glass Company in 1931 for the development of certain types of glass composition. Upon the merger of this donor with the Corning Glass Works the problem of coating glass blocks with a cement-adherent material, assigned to the fellowship, was successfully solved; the patented process is now in industrial use. The fellowship was then asked to carry on cooperative research with one of the Corning laboratories on a project that had been initiated there some time previously on the synthesis of organosilicon compounds intended as impregnants for electrical glass tape. This investigation, in a new field of chemistry, brought unexpected and useful findings. A series of organosilicon oxide fluids or liquid polysiloxanes was synthesized that proved to

—Continued on page 352.

RHYTHMIC CONSTRICTION



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Industrial Medicine

Reg. U. S. Pat. Off.

The editors will exercise care in checking on the accuracy of data printed, but in all other respects articles and opinions of which expression is allowed are the opinions of their authors—the editors reserving in all cases the right to comment on the same, in the current or any subsequent issues, as they may be inclined.

The Journal of Industrial Health, Occupational Diseases and Traumatic Surgery

With which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery."

The Science, the Law and the Economics of Industrial Health

Volume 14 | April, 1945 | Number 4

The Permanente Health Plan

—for Industrial Workers—

CLIFFORD KUH, M.D.,
Permanente Foundation Hospital,
Oakland, California

THE Permanente Health Plan for the workers at the Kaiser Shipyards in the San Francisco Bay Area was founded in August, 1942, upon the three principles of prepayment, group practice, and adequate facilities. There was behind this attempt to found a voluntary prepaid medical care plan in an established community the 10 years' experience of its founder, SIDNEY R. GARFIELD, M.D., in providing medical care for workers on rural construction projects.

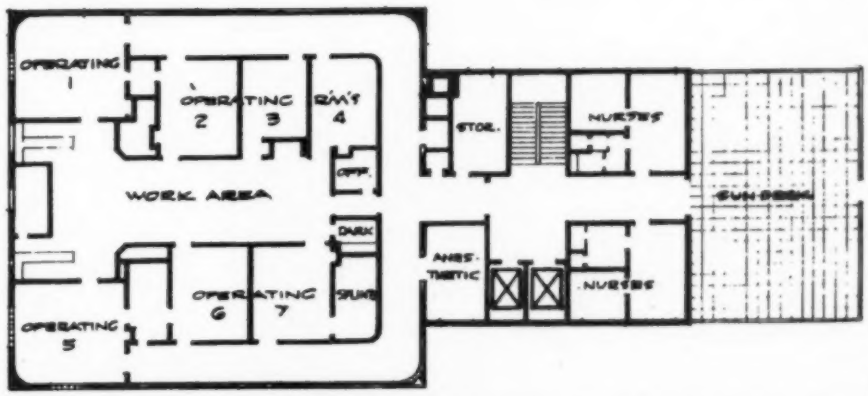
GARFIELD claimed for his Health Plan almost from the start that it contained all the essentials for the voluntary expansion of medical care along lines which will satisfy the public's demand for pre-payment and for free choice, and at the same time meet the physicians' demand for unregimented control of medical practice and for professional advancement. In these days of transitional medicine, when the Pepper Subcommittee on Wartime Health and Education[1] is intensively studying the problem of medical care and when the California Legislature is faced with a dozen bills for health insurance,[2] it may be well to consider the Permanente Health Plan, not only as an effective means of rendering industrial medical service but as a singularly significant development in the broader field of medical economics.

Accomplishments and Future Plans

THE hospitals are administered by DR. GARFIELD and his associates, comprising the chief-of-staff and various department heads. The individual doctors have a voice in administration through an executive committee, the hospital staff association, and a coordinating committee.

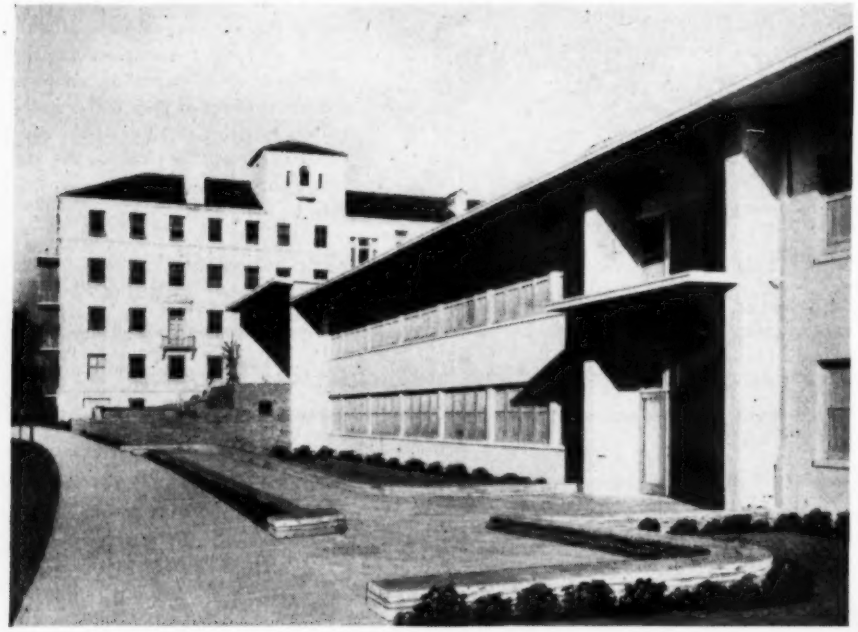
Physical facilities, which carry out the Health Plan's essential principle of completeness, comprise a 300-bed hospital in Oakland, a 125-bed hospital in Richmond, and six first aid stations located within the four Richmond shipyards and prefabricating plant. These represent a total investment of about $3,000,000. The first aid stations and the original facilities in Richmond and Oakland were built or renovated and equipped by the Maritime Commission in 1942 and are rented to the Health Plan. The new wing of the Oakland hospital, comprising 90,000 square feet, which was completed early this year at a cost of $1,500,000, was built almost entirely on Federal loan and will be amortized through annual rental payments over the next 20 years. Remaining equipment and facilities representing a direct cash outlay of about $1,000,000 have been almost completely amortized to date. Similar health plans with equally complete accommodations serve the Kaiser shipyard workers at Vancouver, Washington, and the Kaiser steel workers at Fontana, California.

Plans have already been drawn for a new obstetrical wing of 50 beds with corresponding nursery facilities. An entirely original layout in hospital design is projected, all rooms being outside and arranged around a centrally located space for work. The outer wall of each room will be glass, permitting one-way vision and connecting through a doorway with an outer corridor. The outer wall of the build-



Unique arrangement at Permanente Foundation Hospital, Oakland, California, of seven operating rooms around a central work area, which economizes space, time and footsteps. Entrance of patients to each operating room is from an outside corridor, thus avoiding cross traffic

From the Department of Preventive Medicine and Public Health. Statistics and charts by MARTHA C. EATON, A.B.



Outpatient entrance of the new addition to the Permanente Foundation Hospital, Oakland, built at a cost of $1,500,000—the most modern hospital on the Pacific Coast

ing which bounds the corridor will also be largely of glass, affording the patient practically uninterrupted view to the outdoors. There is also contemplated within this building a new pediatrics department.

Original ideas in hospital equipment are now being blueprinted and will include such innovations as lavatory basins which will swing over the patient's bed and permit washing and shaving without assistance, Fowler beds which are operated by push-button control of electric motors, and bedpan units which extend from a bedside cabinet and allow self service and automatic disposal.[3]

Lobby and reception room in the outpatient department at the Permanente Foundation Hospital, Oakland. The outpatient department is planned throughout to facilitate the accommodation of patients and rapid direction to the proper waiting room

Lobby of first aid station, Kaiser Shipyards, Richmond

Research and Training Program

A GROUP of outstanding scientists has been called into consultation for the design of a building to be devoted exclusively to research and to be erected as soon as priorities permit. A number of research fellowships amounting to approximately $5,000 each for stipend and maintenance are now being offered for scientific investigation in clinical medicine.

It is a principle of the Health Plan that group practice of physicians requires for maximal effectiveness the constant stimulus of research and training. Weekly meetings are held for the 75 staff physicians at which are provided medical and surgical seminars, clinical pathological conferences, and lectures by outside speakers. Our Bay Area and Vancouver hospitals have been approved by the American Col-

lege of Surgeons. They have also been approved for both internships and mixed residencies by the Council on Medical Education and Hospitals of the American Medical Association, and 15 interns and 15 residents have been assigned to the Bay Area hospitals by the Procurement and Assignment Service. The training of junior staff members has been undertaken with the specific aim of accommodating physicians returning from the armed forces.

The hospitals have also been approved for the Senior Cadet Nurses' Training program by the California State Board of Nurse Examiners. There is now in the planning stage a school of nursing, already approved by the State Board, which, according to GARFIELD,[3] "will be

Examining booths, first aid station, Kaiser Shipyards, Richmond

One of the major surgeries at the Permanente Foundation Hospital, Oakland. Seven operating rooms are arranged around a centralized work and sterilizing area, patients entering the surgery through an exterior corridor to eliminate cross traffic

free from the traditional pressure of economics on nursing education, and permit proper emphasis and time in the purely medical aspect of instruction, carrying this on to nursing specialization in the various fields of medical care on a parallel with resident physicians' training in medicine."

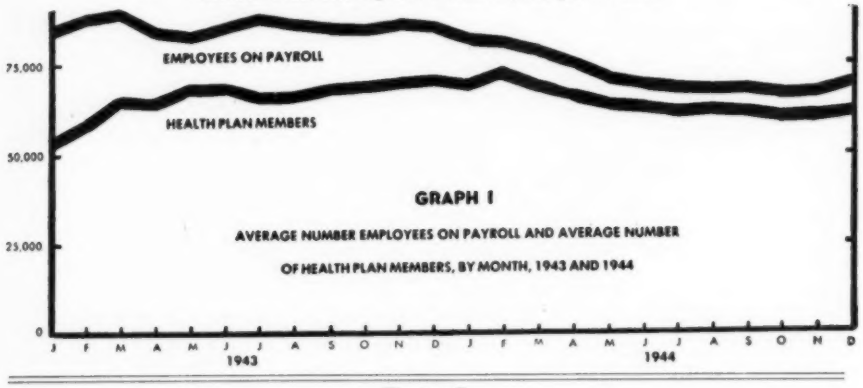
These developments in the Health Plan will mark the first time, so far as is known, that "the average workingman not only will have assured himself adequate medical coverage at a cost he can afford, but also through his support will have built excellent facilities, and in addition will have provided funds for training and research."[3] To the workingman himself, then, his expenditures will be returned in the form of better medical care.

Services Under the Health Plan

MEMBERSHIP in the Health Plan is on a voluntary basis, a weekly payroll deduction of 50 cents providing comprehensive medical coverage for non-industrial ac-

Colorful draperies and chair coverings give a pleasant atmosphere to the patients' rooms at Permanente Foundation Hospital, Oakland. Each bed is equipped with two way communication enabling patients to talk to the head nurse when necessary

Although the total number of employees on the payroll at the shipyards decreased steadily during 1944, the number of employees who were Health Plan members remained quite constant, resulting in a progressive increase in the per cent membership. From 62.0% voluntary participation in January, 1943, a maximum of 92.2% was reached in August, 1944. The average number of voluntary subscribers to the Health Plan during 1944 was 64,719 per month.



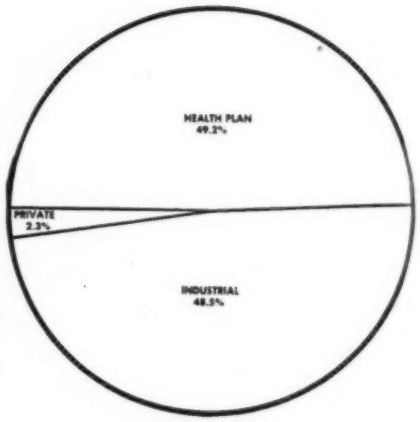
GRAPH I

AVERAGE NUMBER EMPLOYEES ON PAYROLL AND AVERAGE NUMBER OF HEALTH PLAN MEMBERS, BY MONTH, 1943 AND 1944

TABLE I.
SUMMARY OF HOSPITAL STATISTICS, 1943 AND 1944

	1943	1944
Total number of patients discharged	7,359	10,337
Total number of patient days	61,004	74,998
Total number of outpatient visits (includes First Aid Stations)	1,548,525	1,372,110
Total number of outpatient visits (excludes First Aid Stations)	371,700	433,327
Average length of patient stay	8.3	7.2
Average number of discharges per day	20.2	28.2
Average daily bed census	167	205
Average outpatient visits per day (includes First Aid Stations)	4,243	3,749
Average outpatient visits per day (excludes First Aid Stations)	1,018	1,184

Actual figures indicating patient load during the two years are compared. It is evident that the volume of patients discharged, number of patient days and other activities increased decidedly over those for 1943.



GRAPH II

Distribution of the total number of patient visits at all locations: first aid stations, Permanente Foundation Hospitals and Clinics, by classification, 1944. This graph shows the percentage of all patient visits credited to each classification in 1944. Health Plan and industrial patient visits were approximately equal in number, whereas in 1943 industrial patients accounted for 59.6% of the total visits and Health Plan members for 38.3%. The decrease in the number of industrial visits was probably dependent on the decrease in the total number of workers employed (see Graph I). Private patient visits represented only a very small percentage of the total visits made each year.

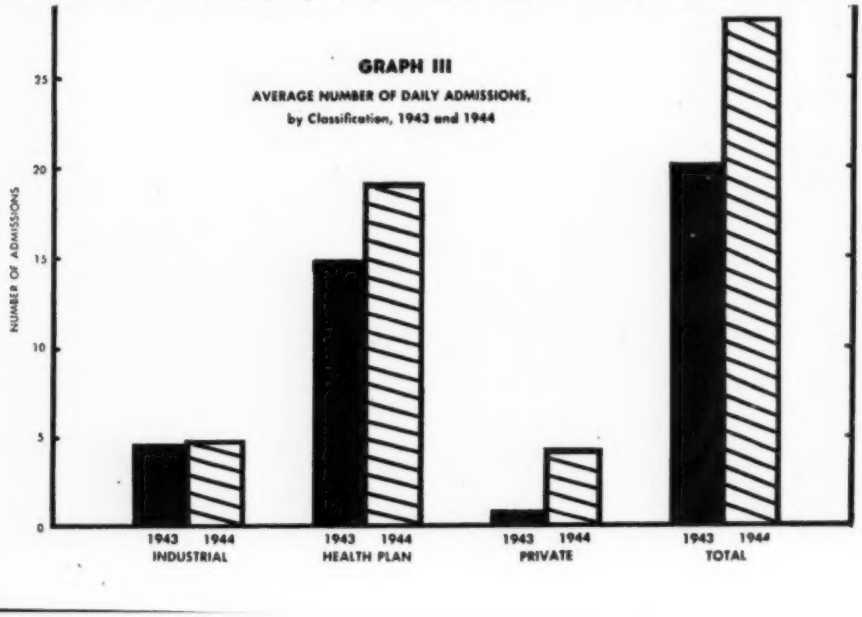
cidents and illness.[4] For industrial disabilities, costs of hospitalization and treatment are paid by the employer through a contract arrangement between the medical organization and insurance company whereby the medical organization receives a percentage of the compensation insurance premium. The patient receives compensation in lieu of earnings in the usual way from the insurance carrier. Families of Health Plan members have not heretofore been included, but now, with increased facilities on hand, membership is being gradually made available to the spouse and minor dependents of shipyard employees.

Since membership in the Health Plan is voluntary, shipyard workers exercise free choice in the selection of the Permanente Hospital as their source of medical care. What is a little out of the ordinary is the selection of a group instead of an individual, but, as has been pointed out many times, most doctors in private practice formally or informally practice in groups—the medical man usually referring surgical cases to a specific surgeon and the surgeon referring medical cases to a specific internist.

Membership in the Health Plan remained relatively constant during 1944, averaging 64,719 per month (Graph I). This constancy of level prevailed despite a drop in the number of shipyard employees during the year from 90,000 to 68,000. The compensatory increase in per cent of membership from 62.0% in January, 1943, to 92.2% in August, 1944, was a remarkable expression of satisfaction in the Health Plan services.

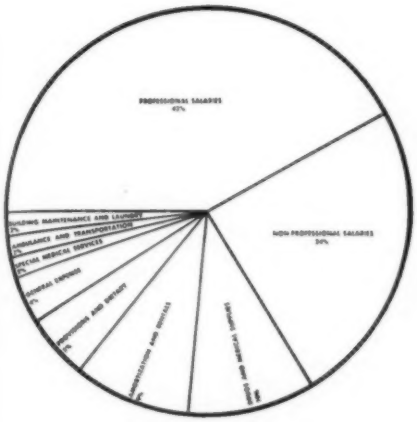
Hospital admissions during the two calendar years, 1943 and 1944, showed a gradual increase (Graph VI). The average number of month-

The average number of daily admissions for industrial patients remained approximately the same during 1944 while admissions for patients covered by the Health Plan increased on an average of four to five a day over those in 1943. About four more private patients per day were admitted this year as compared to last year due to the opening of the pediatric and obstetrical services. Increase in medical care for private patients was primarily in children. 67.8% of the total admissions in 1944 were for patients under the Health Plan as compared to 73.4% in 1943. 16.8% of the total admissions were for industrial conditions and 15.4% were for private patients in 1944. In 1943 these groups composed 22.9% and 3.7% of the total, respectively.



GRAPH III

AVERAGE NUMBER OF DAILY ADMISSIONS, by Classification, 1943 and 1944



GRAPH IV

Distribution of total expense, 1944. All salaries, wages and payroll taxes were included in professional and non-professional salaries. Other expense distributions reflect costs for supplies and other operating expenses only. The item of special medical services, for the most part, represents payments for special nursing services, consultations and examinations by non-staff specialists, appliances, and emergency care in outside institutions.

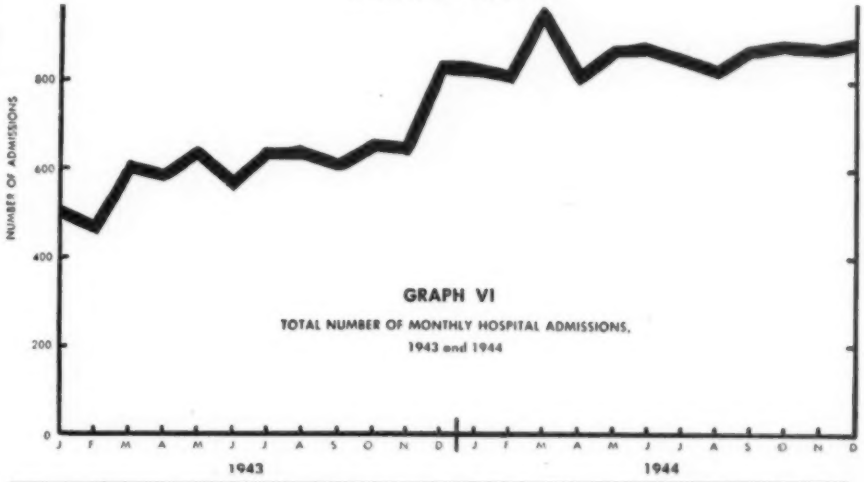
ly admissions for 1944 was 863 compared to 615 for 1943, or an increase of 40.3%. The breakdown of admissions into industrial, health plan and private patient classifications is shown in Graph III. The increase in medical care for private patients in 1944 was due primarily to the opening of pediatric and obstetrical services, offered on a fee-for-service basis as a preliminary step. When the Health Plan is opened to families these services will be offered on a pre-payment basis.

In 1944 there were 1,372,110 outpatient visits to the Oakland and Richmond hospitals and first aid stations (Table 1), of which 49.2% were Health Plan, 48.5% industrial, and 2.3% private cases (Graph II).

The number of major and minor surgical procedures for 1944 is shown in Table 2. Information concerning roentgenograms, physical therapy treatments and laboratory tests is given in Graph V.

During 1944 the total net income for staff physicians was $520,000, the majority of physicians receiving the usual annual salary increase of $1,200. All service personnel received increases in salaries up to the limit permitted by the War Labor Board. In addition to these increases, $15,000 in war bonds were distributed to the personnel at Christmas. The Foundation expended $40,000 during the year for research, training programs and charitable functions. The breakdown of expenses is shown in Graph IV.

There was a large increase in the number of patients admitted monthly to the hospitals in 1944 as compared to 1943. A gradual monthly increase occurred in 1943 with a peak being reached in December. In 1944 the monthly admissions remained fairly constant except for a transitory peak in March. The average per cent occupancy changed from 87.9% in 1943 to 84.1% in 1944. The average number of monthly admissions for 1944 was 863 as compared to 615 in 1943, an average monthly increase of 40.3%.



GRAPH VI

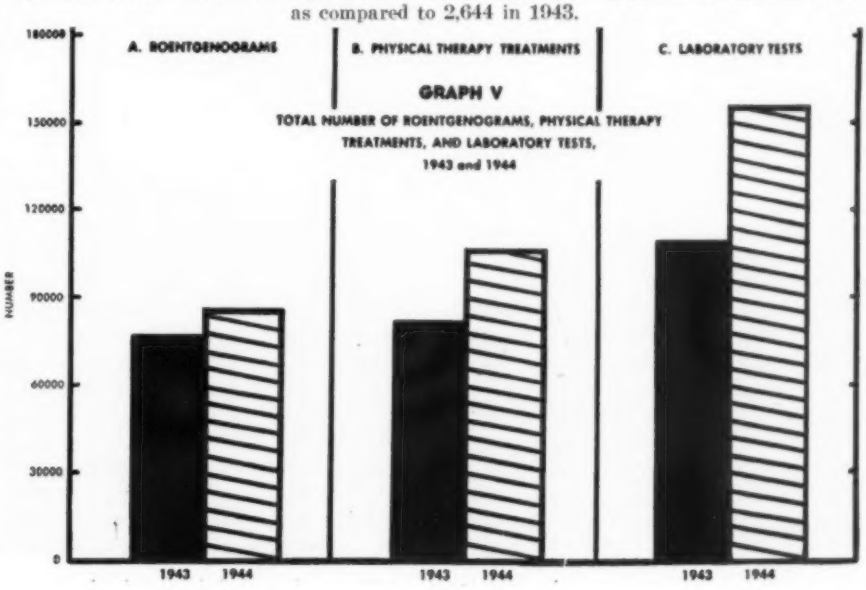
TOTAL NUMBER OF MONTHLY HOSPITAL ADMISSIONS, 1943 and 1944

TABLE II.
TOTAL NUMBER OF MAJOR AND MINOR SURGICAL PROCEDURES BY SERVICE, 1944

Service	*Major*	*Minor*	*Total*
Surgical	986	1,742	2,728
Orthopedic	372	711	1,083
Otolaryngology	144	549	693
Ophthalmology	121	242	363
Urology	114	284	398
Gynecology	127	140	267
Total	1,864	3,668	5,532

The number of surgical procedures performed in 1944 increased considerably over 1943. The obstetrical service was open during only part of 1944, and therefore, no figures indicating extent of operation can yet be presented. 3,420 surgical specimens were examined grossly and 2,118 were examined microscopically. 826 blood transfusions and 725 units of plasma were given.

Graph V-A compares the total number of roentgenograms taken in the two years. There was an increase of approximately 10,000 films taken in 1944. These do not include an average of 500 roentgenograms taken per month at the First Aid Stations in the shipyards. The average number of films per x-ray patient increased from 1.7 in 1943 to 1.9 in 1944. Graph V-B presents the total number of treatments given by the Physical Therapy department. The total volume increased by nearly 25,000 treatments in 1944 while the average number of treatments per physical therapy patient was 1.8 as compared to 1.7 in 1943. 93.4% of the patients were referred from the outpatient clinics and the remainder from the hospital. Graph V-C compares the total number of laboratory tests performed during 1943 and 1944. Of the total number of procedures done 46.9% were for hospital patients and 53.1% for outpatients. There were 7.1 laboratory tests done per inpatient. In 1944 a total of 34,371 routine urinalyses, 13,250 complete blood counts, and 10,090 blood chemical determinations were performed. 4,015 electrocardiagrams were made in 1944 as compared to 2,644 in 1943.



GRAPH V

TOTAL NUMBER OF ROENTGENOGRAMS, PHYSICAL THERAPY TREATMENTS, AND LABORATORY TESTS, 1943 and 1944

Preventive Program

PERMANENTE'S program places due stress on prevention, which is an important part of any industrial program. It has long been the ideal of physicians that they should prevent illness and keep patients well. Yet, under the present system of medical economics, such prevention of illness actually diminishes the income of physicians and hospitals, for both depend financially on the sick patient. In contrast, the Permanente Health Plan reverses the situation. Since the prepaid funds go directly to the medical organization, efforts to keep patients well benefit the entire Health Plan through providing more funds for remuneration of personnel, for teaching, and for research. Pre-payment itself tends to prevent serious illness, because it removes the cost barrier when medical consultation is necessary. Hence, early treatment is encouraged.

A public health committee has been organized, whose chief function is the coordination of the staff physicians' preventive medical and public health activities—control of venereal disease, tuberculosis and communicable disease; maternal and child hygiene; nutrition; industrial hygiene and selective placement; and public health education. There is thus developed a concerted interest in the preventive medical problems of the affiliated industry, the like of which is practically impossible of attainment in any other form of medical practice.

The treatment of venereal disease in covered under the Health Plan. Every effort is made to diagnose all cases early and treat them intensively. Shipyard blood donors found to have positive Kline tests are also referred for evaluation. The state and local health departments cooperate with the Health Plan in following patients, lapsed cases and contacts.

In the field of tuberculosis control the provision of readily accessible medical services has resulted in the securing of over 1,200 chest x-rays on Health Plan members monthly. Plans are now being made to step up this program through having the doctors in the medical clinic order a chest x-ray, whenever practical, on *every* clinic patient. At present we are surveying all patients who had a chest x-ray more than a year ago in order to compare present and past findings.

Christmas Seals and TB Bugs
The Contra Costa County Tuberculosis Association is conducting a survey of tb in industry. They brought their photo-roentgen unit to the Field Hospital and encouraged workers from all four yards to come have a free x-ray. These were checked by their doctors, and any suspicious cases were reported to our Permanente doctors. They tell us that all cases have been further examined and advised about the best possible care. We have wanted a photo-roentgen unit to take x-rays of all employees. They are in great demand, but we will let you know when our unit arrives so that you can take the fullest advantage of this quick, easy check-up.
DON'T LET
Doctor Clinton of the Field Hospital examines a chest x-ray for possible signs of the tb bug.
Photo by Earl Rose.
WHAT TO DO
DO cough and sneeze into a handkerchief.
DO keep a distance when you talk.
DO get a full night's sleep.
DO stay home and go to bed when you
a fever.
DO have a check-up if you are losing
or have a persistent cough or cold.

Two-page article on prevention of tuberculosis, typical of the many articles on health topics appearing

Educational Aspects

FOR the control of infectious diseases we have relied on a number of educational procedures, including noon-hour loudspeaker programs. These loudspeaker programs had previously been employed in the shipyards exclusively for entertainment, for War Bond and Red Cross drives, and for informative purposes. Through the energetic work of the hospitals' director of public relations, who is a member of the public health committee, the labor-management committees in several yards have organized hospital subcommittees which are sponsoring bi-weekly loudspeaker programs on health topics or on the function of the Health Plan itself.

Rumor: "Welders get tb." WRONG. Our doctors say that no craft is more apt to get tuberculosis than any other. Living under strain for a long period is the chief cause of tb

A MONTH AGO Ed Duncan had a record that read like this: Name: Ed Duncan. Age: 38. Occupation: Flanger's helper. Salary: $50 week.

He had a bank book, too. The first one he ever had. Between them he and his wife were making the little figures in that book climb steadily. From $0.00 to $500.00 in the year they'd been working. Quite a difference from the years Ed dug ditches for a living in Los Angeles, or looked for something to dig.

Today Ed has another record. It reads: Name: Ed Duncan. Age: 38. Occupation: Former Flanger's helper. Diagnosis: Active pulmonary tbc 3c. Recommendation: Immediate hospitalization.

That means that Ed's chest is riddled with cavities made by the bugs that cause tuberculosis. "Oh, well," you shrug, "Tough on the guy, all right. But it doesn't concern me."

Doesn't it?

Who Gets Tb?

Do you know who gets tb most often? Maybe you still think it a disease of frail young ladies, a disease called consumption. But, it's young men that are most apt to have it, men who have overworked, who are under strain over a long period of time, farmers or men who work in heavy industry, like Ed.

That's the dope right here in California, as it is all over the country. Figures just published by the State Department of Health show that the most common victims are unskilled laborers. However, there are hundreds of men in skilled crafts in the shipyards who can also get it. Last year twice as many men in the state got tuberculosis as women: 4,774 men vs. 2,845 women. And these men were at the peak of their usefulness.

Many of us think tuberculosis isn't an important disease anymore. We've been told it's been wiped out—almost. Well, it has decreased a lot. But when a fellow reaches 15, from then till he's 34, tuberculosis is still the greatest threat to his life.

Don't Over-do

Why is this so? Well, one reason is just because they *are* at the peak of their usefulness. They over-do. Look at Ed. He was tired from working overtime. His body, like yours, normally has busy white cells in the blood whose job it is to fight the germs that make guys sick. Ed's warrior cells had been fighting cold and flu bugs all winter. They had worked overtime, too. And did Ed help by eating the right food that would help repair his broken-down tissues? No, he grabbed a sandwich at Joe's Place.

Ed probably picked up his tb bugs when he was a child. Our doctors tell us that most often a tb patient will remember that his grandmother was always coughing, or that he had an uncle who died of tb. That means that he was exposed when he was young, and the bugs may have been in his body all this time.

Ed wasn't so different from a lot of us, was he? How many of us want a record like Ed's, a medical record? Or would you rather do something so you can hang on to your job, and your bank book?

The tb bug doesn't let you know it's digging a hole half way to China in your lungs till after the hole is dug. Then it may be too late, and you will have passed the bugs along to other fellows.

Have a Check-up

If you have had a cough or cold that seems to hang on, or if you have been losing weight steadily for several weeks, you should have a check-up. Those are the first signs. The early cases can be cured. This is why our doctors want a chance to tackle the bugs while your body still has strength to fight back. Either of our Permanente hospitals will welcome you for a check-up.

Our hospitals, however, are not equipped to care for tb patients. The disease is a very contagious one and it must have special equipment, specially trained nurses and doctors, and the climate is an important factor. Most counties and states have these special hospitals set aside for tb patients only.

But our doctors can diagnose the disease and advise you where to go for care. And remember, when it is caught early 95 per cent of the cases are cured in from six months to a year. But tb in the advanced stages has earned the name "white plague." Doctors can help advanced cases. Sometimes they can get a man with an advanced case well enough to do light work, but they seldom effect a complete cure.

in "Fore 'n' Aft," the periodical, published for the Kaiser shipyard workers, Richmond, California

Staff physicians appear on these programs. The local health officer also participates.

Public Health education through the pages of *Fore 'n' Aft*, the shipyard periodical, has afforded an unusual opportunity to take advantage of the staff's editorial and artistic talent. The result has been a series of double-page articles on many aspects of health, which have been written in the language of the worker and laid out so attractively that they excel in eye appeal the usual health article. Particular emphasis has been placed on the common cold and other respiratory diseases, because statistical analysis by the Kaiser organization of absenteeism records has revealed that these illnesses, as is well known, are the chief causes of absenteeism.

As a joint project by the director of the Oakland Health Department and staff physicians, a popular course on health was given last fall at the East Bay Branch of the California Labor School. Subjects covered were: What to do when illness strikes, community health services, common illnesses and their effects, recent advances in medicine and surgery, health problems after 40, and bringing more and better medical care to more people.

Our gynecologists have established a cancer detection clinic which is an integral part of the general gynecological clinic.[5] All women coming to the clinic for whatever cause are given a careful examination for possible breast and pelvic pathology. Literature is distributed stressing the importance of periodic examinations and the fact that early cancer is curable.

Also a definite step forward was taken by one of our gynecologists[6] in preparing women for strenuous shipyard work through the recommendation that a physical training course be given. It was found that many women welders left the yards because, although they liked the work, they were physically unable to do it. The largest yard has accordingly erected a scaffolding outside the welding school where the woman worker is taught how to climb different types of ladders, how to lift heavy loads, and how to climb with loads. The program has cut down the number of early resignations.

Selective Placement

ANOTHER preventive project has been concerned with the selective placement of workers in industry. In collaboration with Bert Hanman, of the Regional Office of the War Manpower Commission, a new technique has been developed, known as physical demands and capacities analysis.[7,8,9,10] Its essential feature is that the same basic pattern of 25 physical factors, such as lifting, carrying and handling, and 25 environmental factors such as inside, outside, high temperature and low temperature, is used to analyze both the physical demands of the job and the physical capacity of the worker. The utilization of the same pattern facilitates the task of the placement officer in matching job and worker.

With the technique as a basis,

Nurses' station of a hospital unit at Permanente Foundation Hospital, Oakland. The unit corridors cross at right angles, the nurses' station being located at the center of the cross to maintain quick and efficient service to all patients. A direct call system from every bed to the station by loudspeaker saves steps and time

typical jobs were analyzed in one of the yards. The Permanente Foundation granted funds for the publication of information on the technique of physical demands and capacities analysis, including the shipyard job analyses and a resume of our early placement experience, in a 627-page volume for national distribution.

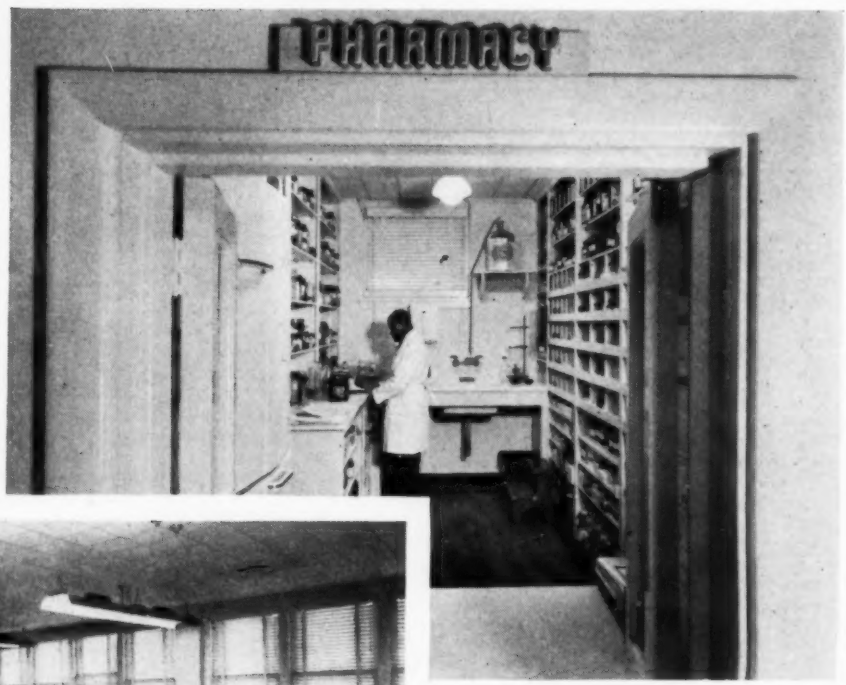
An outgrowth of the selective placement program has been the establishment of a rehabilitation service for incapacitated shipyard workers through the cooperation of the State Bureau of Vocational Rehabilitation.

This State Bureau requires a full report on each candidate for rehabilitation, setting forth his physical capacities, diagnosis and prognosis.

Since our staff physicians have had considerable experience with the physical capacities analysis, the Bureau has waived the use of their regular report forms and instead we substitute the physical capacities analysis form.

The control of shipyard occupational diseases, which are at a minimum, is primarily a problem of ventilation. This is the responsibility of the safety department. For the more effective study, follow-up and control of cases of occupational disease, an industrial hygiene clinic is conducted to which all cases of occupational disease are immediately referred.

During the past six months only two cases of occupational disease have been seen in the clinic—one, a refractory case of skin sensitivity and the other a case of carbon tetrachloride poisoning, the result of the accidental spilling of the solvent.



An outpatient dispensing pharmacy is an integral part of the Permanente Hospitals. During January, 1945, nearly 20,000 prescriptions were issued to patients at the Oakland and Richmond hospitals

Laboratory of the Permanente Foundation Hospital, Oakland, is completely equipped to assist diagnosticians. The most modern equipment, placed in a well-lighted and sound conditioned room, permits the technicians to work most efficiently and with the utmost accuracy

Hospital Staff Personnel

WHILE planning the prevention of illness among shipyard workers we have not neglected to plan for members of the hospital staffs. The personnel have been divided into categories[11] depending on exposure to sick patients or other hazards and upon the possibility of transfer of illness to patients or fellow workers, and various procedures, such as Kline test, chest x-ray, smallpox inoculation, Schick or Kellogg test, diphtheria immunization, blood count, throat culture, and stool examination, are recommended as indicated. For example, food handlers receive periodic stool examinations, x-ray technicians complete periodic blood counts, and obstetrical nurses throat cultures before returning to work after pharyngitis.

The diet and kitchen facilities of the Permanente Foundation Hospital in Oakland are modern to the last degree. These units are typical of some of the latest improvements incorporated in this new unit. The tray carriers are equipped with heating units so that the trays of food may be maintained at the proper temperature until delivery to the patients

Scene in pediatrics department of the Northern Permanente Hospital, Vancouver, Washington

Modern programs of hospital construction should have as their aim the ample provision of a more inclusive type of hospital service. The subcommittee has studied with interest the growing trend toward utilization of a relatively new type of facility called a medical center, which combines and coordinates the three major aspects of modern medical care—the preven-

From the foregoing it becomes evident that Permanente through pre-payment has created and paid for adequate hospital facilities and engaged in a comprehensive medical care program. Permanente provides for training of physicians and for research. In the Health Plan's organization we find the epitome of the medical center idea.

In this connection it might be well to quote from the report of the Pepper Subcommittee on Wartime Health and Education:[1]

"Hospitals were formerly considered only as places in which to care for the seriously ill, and even today many hospitals are nothing more than that.

Noon-hour loudspeaker health education program in Kaiser Shipyard, Richmond. Staff physician talking on the common cold

tive, the diagnostic, and the therapeutic services. The medical center brings together doctors' offices, diagnostic and laboratory equipment, hospital beds, and preventive work. It furthers group practice by physicians, surgeons, and dentists; encourages experimentation in research; and stimulates dissemination and exchange of medical knowledge.

"This principle of combining the preventive, diagnostic, and curative services of medicine into a single functional unit, here called the medical center, has been advantageously applied on a large scale in certain great university centers. It also is applicable, however, to the smaller-scale needs of rural communities throughout the nation. The establishment of a network of 'outpost clinics', to use the phrase of a representative of the American Medical Association, the creation of 'diagnostic centers', as urged by the Surgeon General of the Navy, and the 'expansion of the present functions of the hospital,' advocated by the spokesman of the American Hospital Association seem expressions of the same basic aim—the provision of facilities suited to the practice of modern, scientific medicine."

It is possible that the future will see other hospitals similar to Permanente built on a state-wide or nation-wide scale as a means of bringing to more people better medical care—medical care under a plan which preserves private enterprise in the practice of medicine.

Bibliography

1. Interim Report Number 3 from the Subcommittee on Wartime Health and Education to the Committee on Education and Labor, United States Senate, Government Printing Office, Washington, January, 1945. Reprinted in *J.A.M.A.*, 127:36, January 6, 1945.
2. Health Insurance Legislation in California. *J.A.M.A.*, 127:405, February 17, 1945.
3. GARFIELD, SIDNEY R.: Second Annual Report of the Permanente Foundation Hospital. *Permanente Foundation Med. Bull.*, 3:31, January, 1945.
4. KUH, CLIFFORD: Permanente Health Plan. *Railroad J.*, 8:31, August, 1944.
5. FOOTER, WILSON: The Gynecological Cancer Detection Clinic. *Permanente Foundation Med. Bull.*, 2:165, October, 1944.
6. PETERS, HANNAH, Permanente Foundation Hospital.
7. Physical Demands and Capacities Analysis, Region XII, War Manpower Commission, Bureau of Manpower Utilization, Division of Occupation, Analysis and Manning Tables, San Francisco, California, and Permanente Foundation Hospitals, California. May, 1944. Published by the Permanente Foundation.
8. KUH, CLIFFORD, and HANMAN, BERT: Current Developments Affecting the Physician's Role in Manpower Utilization. *J.A.M.A.*, 125:265, May 27, 1944.
9. KUH, CLIFFORD: Physical Demands and Capacities Analysis. *Permanente Foundation Med. Bull.*, 2:18, January, 1944; 2:88, March, 1944; 2:135, July, 1944.
10. KUH, CLIFFORD: The Interrelationships of Selective Placement and Rehabilitation. *California & West. Med.*, 62:6, January, 1945.
11. LEVINE, EUGENE B., Permanente Foundation Hospital.

The Release of Fascial Ligamentous Contractures in Physical Rehabilitation

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THERE is considerable evidence that outside compression on peripheral nerve pathways can cause irritation to such nerves, producing signs and symptoms in their peripheral motor and sensory distribution. Examples are noted in herniation of intervertebral discs, wrist drop from crutch palsy, ulnar nerve neuritis in the hand from irritation to the ulnar nerve at the elbow.

In such a manner may peripheral nerve signs and symptoms be produced by the compression due to contracted fascial ligamentous bands.[1]

Fascia encompasses all structures of the body and has numerous bony attachments as guys. In localities where the fascia needs to resist particular strain, there is a thickening into what are termed ligaments, e.g., iliotibial band and ligamentum flavum.

A property of the fascia is to reshorten following the loosening resulting from the stretching brought about by body activity. This prevents the bony framework from dislocating and coming apart from lack of restriction of extent of motion. This constant fascial ligamentous shortening property is well demonstrated in athletes where the high hurdler, high jumper, or pole vaulter finds each year, upon the approach of track season, that he is stiff and must undergo extensive stretching to limber up in order to perform the extent of motions necessary for his specialty. The prospective dancer taking basic ballet training must do stretching exercises for many months to "loosen up."

As life progresses the fascia, if not kept loosened, tends to tighten, so that little by little man becomes stiffer and stiffer. The instinct to stretch is well illustrated by animals, e.g., in the cat, the first act of which upon arising is to stretch luxuriantly in all directions.

The physical trials and tribulations of life include a great many factors that instigate excessive shortening of these fascial ligamentous bands, resulting in temporary and in many instances chronic contracture. Such factors include:

A. Excessive strain causing irritative tear of fascial fibers, as illustrated by the individual who, when lifting, suffers an acute back pain, but in a few minutes may sufficiently recover to renew his activity. He, however, may consult his doctor the next day with the statement, "the pain sort of wore off after the strain, but this morning I was so stiff and sore in my back and down to the leg that I had to roll out of bed in order to get up." In the interim, the irritated fascial ligamentous bands reacted by gradually shortening.

B. Chronic posture habit results in a shortening of the fascial ligamentous bands to accommodate the posture maintained. Office workers, seated a good share of the time, have a tendency chronically to hold the head and neck in a forward thrust position with compensatory dorsal round back. In time the cervical and dorsal fascia shortens, and these individuals are then subject to chronic neck pain frequently radiating into the peripheral distribution of the involved nerves, causing basal headache or pain and sensitivity of the scalp or pain, and other nerve irritation signs and symptoms into the shoulders and arms. Also the postural position of a chronically forward tilted pelvis frequently results in a lumbar sway back with concomitant ligamentous contracture maintaining the position. This is the postural defect found in patients suffering from dysmenorrhea,[2] explaining the cause of the back pain and peripheral nerve distribution pain in the lower abdominal wall.

C. Endocrine defects, such as low estrin levels, instigate shortening of the fascial ligamentous bands, as shown by Hisaw[3] and his co-workers, first at Wisconsin and more recently at Harvard.

D. Irritative lesions of the bones and joints, such as atrophic arthritis and gout, frequently result in marked shortening of the adjacent fascial structures, the correction of which has served as the impetus for extensive study of body mechanics since Goldthwaite's original contributions.

E. Chilling results in acute shortening of the fascial structures. The histories of back complaints will often include the fact that exacerbations follow exposure to damp cold. An individual with recurrent "kinks in the neck" may relate that exacerbations follow exposure, as, for instance, auto riding in the chilly night air.

F. General diseases, such as poliomyelitis, meningitis and malaria, result in acute fascial ligamentous contracture, causing severe pain in the neck and back with limitation of motion, sensory and motor nerve irritation, and peripheral nerve distribution pain.

G. Interference with the normal range of motion of joints will result in marked fascial ligamentous contracture in many instances. This is illustrated by the flexion abduction contractures in individuals with paretic gluteal muscles, and in arthritic deformities of the hips and spine, and in hips and lumbar spine following leg amputations.

The diagnosis of fascial ligamentous contracture in any given individual is readily confirmed by testing the available extent of motion. The restriction of normal extent of motion is easily ascertained. In testing, the differentiation between muscular, fascial ligamentous and bony restriction is readily appraised. Forcing the motion slightly past the point of restriction will exacerbate the complaint. There is a constant anatomical relation between the fascial ligamentous bands and the nerves passing through and by them. It is thus possible to correlate certain clinical symptoms with the tightening or contracture of particular bands. For example, a contracted iliotibial band restricts straight leg raising in adduction. If the contracture is sufficient, pain will be produced in the region of attachment to the posterior aspect of the pelvis, as well as into the peripheral distribution of one or more branches of the sciatic nerve. Included in this are the symptoms of "spastic hammer toes," "metatarsalgia," painful heels or "Morton's toe" which may be increased by exacerbation at the pelvic level of the compression irritation of the involved nerves.[4]

Correction of such disabilities entails loosening of the contracture to allow normal extent of motion, which, in turn, relieves the compression of the peripheral nerve pathways.

The late Dr. Baer, professor of orthopedics at Johns Hopkins, learned years ago that manipulation by forced straight leg raising, under anesthesia, would produce complete relief in many cases of sciatica. Later Dr. Roberts, at the Hospital for the Ruptured and Crippled, New York, performed posterior pelvic fascial stripping in a series of cases, obtaining relief from sciatica. Dr. Heyman,[5] in Ohio, showed that relief in cases of sciatica could be obtained by surgical release of the tight fascia, using the Smith-Petersen sacro-iliac fusion operation exposure. Dr. Frank Ober,[6] of Boston, has, in cases of backache with sciatica, been able to produce relief by means of releasing the thickened contracted fascia through a lateral femoral fasciotomy. Dr. Ayers,[7] in New England, and others, have emphasized the role of the ligamentum flavum in production of symptoms of peripheral nerve irritation.

DURING the past few years it has been found possible to release contractures by means of progressive lengthening through stretching.[4,8,9] The patient is instructed in the particular necessary stretchings, which are done three periods daily. Thus is produced a gradual loosening similar to that obtained by the athlete or dancer preparing for his specialty. Each stretch exacerbates the symptoms momentarily. In instances where the individual patient is unable to produce a sufficient stretch by himself to ensure progressive loosening, he must be given assistance by passive stretching as indicated. In this manner the contracted fascial ligamentous bands are loosened gradually, without tearing. Relief will be obtained when sufficient release of the contracted fascial ligamentous bands has been obtained to free their attachments from constant strain, and the involved peripheral nerves from compression irritation. The stretching may be regarded as a tug of war between the patient and his ligaments. As each stretching causes momentary irritation of the involved nerves, it is necessary to maintain an optimum balance between stretching and irritation. Each stretch must be carried out to the fullest extent possible in order to obtain progressive loosening of the fascia. Anything short of this will produce only irritation. Treatment must also include eradication as far as possible, of etiological factors originally instigating the fascial ligamentous contracture. For example, if a gouty diathesis is present, specific treatment for gout should be instituted for several weeks prior to start of the stretchings so as to prevent instigation of an acute flare up of gouty arthritis. Endocrine deficiencies[1] in all instances should be thoroughly corrected.

The particular stretchings taught the patients as required are as follows:

Stretching No. 1

STRETCHING NO. 1—forced rotation in the upper cervical spine region. Seated in a chair with one hand firmly grasping the chair seat near the posterior chair leg, the head and neck are forcibly rotated (twisted) toward the opposite direction. When the full extent of possible rotation has been obtained, the palm of the free hand is placed on the chin to force rotation a bit farther. This stretching is repeated three times to each side three periods daily. Complaints of "basal headaches," "occipital headache," "pain and sensitivity up over the scalp," "frontal and temporal headache," "deep aching in the eye," and transient "blurring of vision" may thus be relieved. The latter symptom of "blurring of vision" has to do with dilatation and contraction of the pupils as a result of autonomic nerve irritation stimulus involving the cervical ganglia.

STRETCHING NO. 2—forced rotation tilt in the middle and lower cervical spine region. Seated in a chair with the hand on one side firmly grasping the chair seat near the posterior chair leg, as an anchor, the head and neck are rotated 45° in the opposite direction. The

Stretching No. 2

chin is then retracted the maximum distance possible and held retracted (pulled in) througout the stretch. The head and neck are then tilted forcibly toward the side of the head opposite to the hand holding the chair with the aid of the free hand which is placed over the head to the ear just back of the frontal hair line. This stretching is repeated three times to each side three periods daily. Complaints of post cervical pain and aching, "stiff neck" pain and aching into the trapezius region and tingling numbness into the arms and hands may thus be relieved. It is frequently advisable to use stretching No. 1 in conjunction with this stretching.

STRETCHING No. 3—forced rotation in the dorsal spine region. Seated in a straight back chair with the feet hooked around the front chair legs, the shoulders and upper dorsal spine are rotated (twisted) forcibly to one side, aided by grasping the back of the chair with the

Stretching No. 3

hands and strongly pulling. This stretch is repeated three times to each side three periods daily. Complaints of "pain between the shoulder blades," intercostal "neuralgia," or "neuritis" or "pleurisy" may thus be readily relieved in many patients with negative organic heart and lung pathology.

STRETCHING No. 4—forced lateral tilt in the dorso-lumbar and lumbar spine and lumbosacral area combined with extension of the pelvis at the hips. The patient stands with heels and toes together about 18 inches (45 cm.) from, and with side to, a wall. The elbow is placed against the wall at shoulder level with the forearm and hand resting on the wall. The heel of the opposite hand is placed in the hollow on the posterior aspect of the greater trochanter of the hip. The shoulders are kept in a line with

Stretching No. 4

the elbow perpendicular to the wall and not allowed to shift forward. The knees are kept completely extended and not allowed to flex. The abdominal and gluteal muscles are strongly contracted while the hips are shifted slightly forward and in toward the wall, aided by pressure on the greater trochanter of the femur from the heel of the hand. The objective is to force the extent of sideward and forward shift of the hips in toward the wall far enough not only to place a strain on the contracted ligamentous bands but to gain a progressive stretch as well. This accentuates the symptoms momentarily at each stretch. This stretch is repeated three times to each side three periods daily. Complaints of lumbar and lumbosacral backache, 10th, 11th, 12th dorsal and 1st lumbar peripheral nerve distribution pain into the abdominal wall, inguinal region and perineum (ilioinguinal and iliohypogastric nerves) may thus be relieved. Dysmenorrhea[2] is included in this category.

STRETCHING No. 5—forced forward flexion of the pelvis at the hips with the legs in neutral as to abduction-adduction and rotation. Standing with heels and toes together, knees held completely extended and arms hanging loosely toward the toes, a sharp forward bow at the hips is carried out six times in succession. Attempts should be made to advance the downward extent of motion with each succeeding bow. This series of six stretches is repeated three periods daily. Complaints of back pain in the superior sacro-iliac joint region radiating "through the hip" to the anterior high thigh or inguinal region, and pain and sensitivity over the medial aspect of the knee and patella radiating through the knee, and edematous effusion in the knee joint may thus be relieved. These complaints in the area of distribution of a peripheral nerve are produced by irritation at the pelvic level of the femoral nerve (e.g., femoral nerve fibers distributing to the ramus infrapatellaris of the saphenus nerve).

STRETCHING No. 6—forced forward flexion of the pelvis at the hips with the leg internally rotated in adduction. The patient is instructed to stand, with knee kept fully extended, on the affected leg about 20 inches from and with his back to a table, reaching back and resting the hand of the affected side on the table for balance. The opposite leg is then, with knee flexed, twined anteriorly tightly around the affected leg, foot being placed in tiptoe position on the floor posterior and lateral to the heel of the affected side. The arm is then swung to follow its corresponding leg, with finger tips hanging toward the heel. From this position the patient bows forward

Stretching No. 6

at the hips, reaching for the heel, at the same time dropping the entire heel from tiptoe position to the floor. The action of letting the heel drop from tiptoe position helps to keep the knee of the affected side in hyperextension by pressure from the crossed-over leg. The objective is to reach for the heel with a LUNGE, throwing the chest downward at the same time. This stretch is repeated in sequence six times to each side, three periods daily. Complaints of back pain chiefly in the inferior sacroiliac joint region radiating into the peripheral distribution of one or more branches of the sciatic nerve as a "Morton's toe," "metatarsalgia," heel pain, cramping in the calf muscles, "spastic hammer toes" or full sciatica may thus be relieved. These complaints in the area of distribution of a peripheral

nerve are produced by irritation at the pelvic level of the sciatic nerve. The nerve compression may, if prolonged, result in marked muscular atrophy or impairment of nerve conduction with loss of reflexes. These signs clear up following release of the fascial contracture.

The length of time necessary to bring about relief of symptoms by the routine stretchings varies according to the severity and locale of the contracture, and the cooperation of the patient. For example, the symptoms of dysmenorrhea[2] will usually be relieved by the end of the second to third month. Symptoms of "spastic hammer toes," "Morton's toe," metatarsalgia and painful tender heels[4] will usually be relieved within three to four weeks.

After relief has been obtained, it is best to advise all patients to continue sufficient stretchings to prevent recontracture.

It must be emphasized that the basic requirements for any plan of physical rehabilitation are a trained, well organized working team supplied with an adequate physical plant in which to carry out the necessary procedures. Each individual to be rehabilitated must be coordinatedly and carefully guided and encouraged both physically and psychologically.

A mental attitude of fear, distrust, discouragement, resentment, antagonism or rebelliousness, if allowed to persist, will controvert any attempted aid.

Summary

THE role played by fascial ligamentous bands in mechanical functioning of the body is outlined.

2. The syndrome of fascial ligamentous contractures producing back pain and peripheral nerve distribution symptoms and signs by means of compression irritation of the nerve pathways is described.

3. Factors instigating fascial contracture are listed.

4. Methods of diagnosing fascial contracture are given.

5. Stretching methods for release of fascial contractures are outlined.

References

1. BILLIG, H. E., JR.: Back Pain and Neuritis. *Am. J. Clin. Med.*, 48: 96-99, April, 1941.

2. BILLIG, H. E., JR.: Dysmenorrhea: The Result of a Postural Defect. *Arch. Surg.*, 56: 611-613, May, 1943.

3. HISAW, F. L.: Experimental Relaxation of the Pubic Ligament of the Guinea-Pig. *Proc. Soc. Exper. Biol. & Med.*, 23: 661-663, May, 1926. HISAW, F. L.: Corpus Luteum Hormone: Experimental Relaxation of Pelvic Ligaments of Guinea-Pig. *Physiol. Zool.*, 2: 59-79, January, 1929. HISAW, F. L., ZARROW, M. X., MONEY, W. L., TALMAGE, R. V. N., and ABRAMOWITZ, A. A.: Importance of the Female Reproductive Tract in the Formation of Relaxin. *Endocrinology*, 34: 122-134, February, 1944.

4. BILLIG, H. E., JR., and BRENNAN, R. L.: Foot Pains. *The Military Surgeon*, 92: 539-542, May, 1943.

5. HEYMAN, C. H.: Thoughts on Relief of Sciatic Pain. *J. Bone & Joint Surg.*, 16: 889-894, October, 1934.

6. OBER, F. R.: Back Strain and Sciatica. *J.A.M.A.*, 104: 1580-1583, May 4, 1935. OBER, F. R.: Role of Iliotibial Band and Fascia Lata as Factor in Causation of Low Back Disabilities and Sciatica. *J. Bone & Joint Surg.*, 18: 105-110, January, 1936. OBER, F. R.: Orthopedic Operations (Steindler). Publisher, Charles C. Thomas, pp. 88-89, 1940.

7. AYER, J. B.: Report on Medical Progress: Clinical Neurology. *New England J. Med.*, 223: 376-380, Sept. 5, 1940.

8. DICK, A. C., BILLIG, H. E., JR., and MACY, H. N. (MRS.): Menstrual Exercises, Absenteeism Decrease and Work Efficiency Increase. INDUSTRIAL MEDICINE, 12: 588-590, September, 1943.

9. WHEELER, IRENE: The Billig Exercise. *The Foil*, official publication of Delta Psi Kappa, December, 1943.

The Industrial Physician

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TO ENUMERATE the professional and the personal qualifications of the physician in industry is a task which cannot be accomplished with any degree of finality. Any definition of what constitutes the desirable physician in industry must remain tentative. Progress in medicine as a whole and advances in medicine as applied to industry will, inevitably, make such a definition subject to change.

It is indeed conceivable that our current thinking will be as obsolete 50 years hence as are many of the observations of that seventeenth century physician, Ramazzini, who may be justly called the father of industrial medicine.

In discussing not only the personal qualifications but the scientific ability of the present-day physician in industry, it is proper that we should consider the attainments and the personal attributes of this early pioneer in the field of industrial medicine. A glance at his early career showed that he wavered between the study of law and medicine. His greatest attribute was his humanitarianism. He displayed an attitude of sympathy for and an understanding of the worker in a period when manual occupations were looked upon with scorn. He disregarded social status at a time when the strata of society were divided by impossible barriers from one another. Yet, he was able to win and retain the confidence and favor of the leaders of this period. He won favor with noble patrons with whom he had long profitable association.

At a time when many physicians were primarily concerned with anatomical study he urged the study of epidemiology, and sought data for medical meteorology. He was not an academic recluse isolated from the many problems of his day. He was, in many respects, a most worthy example whom we may well consider when we attempt to define the qualifications of the physician in industry.

THIS discussion must begin with the prospective medical student since, in a real sense, the doctor is already partly formed before his matriculation into a school of medicine. This man or woman should possess some of the qualities of the pioneer; a sense of high adventure, a willingness—in fact, an eagerness—to be a part in the building of new paths to medical progress. These are the qualifications to be sought, for the reason that, within the next decade or two, the evolution which we shall witness in this field will surpass the expectations of our most sanguine hopes. And, those students who, in their school careers, go beyond the passive assimilation of factual information are the ones best fitted to share in the active, creative years ahead. If one were to ask what curricular demands should be insisted upon in training these students one might name, as of fundamental importance, biology, physics and chemistry. These subjects will particularly affect our daily lives, for in no other fields may we expect such far reaching developments as will occur within these. Emphasis should also be placed upon history, economics and sociology. Stress should fall upon the subjects which orient the student in respect to his human relationships. The elements of human psychology—both normal and abnormal—should be considered an essential part of the premedical curriculum. Still another demand might be made—one removed from the conventional sphere of the premedical program as we know it today. One might ask for a course in salesmanship and accounting in the collegiate years. This is a point of view which this writer has rarely expressed. It is not proposed to develop the ability to "sell" in the commercial sense. However, in the industrial and commercial setting in

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which the physician we have in mind will function, such training may help bridge the gap between this environment and the laboratory or lecture hall. Then, too, we are forced to admit that the appeal to managerial support for the medical department in industry demands some degree of salesmanship, at least it demands the capacity to translate indisputable human needs as well as legal requirements into such a form as may command the attention of the occasional executive mind whose thinking is largely in material terms. In addition, it has been my observation that the well-trained salesman frequently possesses a delicacy of human understanding and a capacity for personal adjustment in human relationships not always apparent in the professions. Let it be understood that it is these qualities which are sought when we mention training in salesmanship and that, whatever may be the means for the development of such qualities, they should be utilized, inasmuch as common observation would seem to indicate their desirability in industry. The industrial physician must, on occasion, be more than a physician and for such occasions he should be adequately prepared. In addition, accounting training provides information valuable in the control of budgets. This is a vital matter for the medical department in industry.

We come now to a consideration of the undergraduate medical training for the practice of industrial medicine. This question cannot be dismissed in its entirety by the mere acceptance of the present conventional course of study as suitable for the purpose. It will probably be generally admitted that the highly developed curriculum of our medical schools places them in the vanguard of medical teaching. It is the very fact of this phenomenal growth which enables us to seek, in the curriculum of the medical school, certain specific elements for emphasis which should aid in accomplishing two objectives: first, the preparation of the physician in private practice to recognize and deal with disease which originates in industrial exposures; and, second, the establishment of a strong foundation upon which the future industrial physician may erect the superstructure of specialized study. These objectives may call for a revision of our present curricula; they demand the placing of emphasis upon certain courses already offered in our schools and, possibly, the inclusion of certain specific topics within these courses. While we do not wish to imply that any of the currently required studies should be relegated to positions of secondary importance, we should like to point out the necessity of attaching great significance to biochemistry, histology—particularly in its hematological aspects, physiology, pathology, bacteriology, pharmacology and toxicology. With such emphasis it should then be possible in the senior year to establish a course in industrial medicine, thereby correlating work done in other departments in the application of medical science to our industrial units of society. This should not be an elective course since at least 90% of our graduates have in the first few years of practice some industrial contacts, directly or indirectly. In this manner the student will become aware of the opportunity and the importance of the field.

In the clinical years of medical training the primary effort should be directed towards the development of the powers of independent observation. The didactic work in medicine and surgery should be supplemented by extensive opportunity for first-hand individual study of cases and the synthesis of clinical observations into diagnostic and therapeutic conclusions which the student reaches by his own efforts and which are later revised and supplemented through the indispensable check made by the teaching staff. The reason for emphasis on these matters lies in the basic necessity of developing, in our industrial physicians, the capacity for independent effort and self-reliant attitudes. This does not suggest that in the performance of his practical duties the industrial physician should always consider his judgment final. It does mean, however, that he must be taught to accept responsibility in the usual case rather than delegate it as a matter of routine. Only in this manner is it possible to develop effective physicians for this field—physicians to whom their work will be a continual challenge to further professional growth. To the question of this capacity for continued professional development, we wish to give the strongest possible emphasis. No physician in industrial medicine will ever be permitted to rest his claims to professional knowledge and skill on any given period or type of preparation. The unending changes in the nature of industrial hazards and the prevention and therapeutic measures, therefore, will force the physician either into a pace of rapid professional growth or into the dangerous calm of professional stagnation. It is for this reason that the student must achieve the capacity of independent work and study if he is to remain an effective worker and student in this field. This point of view is not to be construed to mean that consultation with the specialist is rare in industry. But consultation is always best used by those possessing the best medical background and the most initiative, adroitness and intelligence in their medical thinking.

Certain aspects of the course in medicine should, possibly, be singled out for special consideration. They are those phases which deal with the blood dyscrasias, with pulmonary pathology and dermatological lesions. In the realm of hematology the student should become thoroughly conversant with the normal differential count. The normal size and morphology of blood cells should be readily recognized. The more common departures from normal should be understood. In the detection of pulmonary disease, considerable skill should be developed. In this is included the ability to detect anomalies on the x-ray plate and to identify the more common lung affections. Some acquaintance should be developed with the x-ray appearance of tuberculosis and the pneumoconioses. In dermatology, not only should the student learn to recognize the common lesions, but he should also be fairly well grounded in the manifestations of sensitivities, in their underlying theories, the tests for their detection and the means for their control.

In the surgical clinics, beyond the usual contact with the major surgical problems, there should be a greater exposure to minor surgery in its various phases. As much as it may be possible to permit it, there should be actual participation of the student in the care of these cases. It may be said, in objection to this point of view, that sufficient experience in this field will be gained during the internship in the majority of hospitals. However, it is probable that a closer supervision of technique will be possible in the highly organized teaching hospital than will obtain in the students' later work in the emergency room.

One phase of clinical training which merits more stress for its value both to the general practitioner in private practice and to the industrial physician, is orthopedics. In fact, while the question is not pertinent to the subject of this paper, it appears that many physicians are of the opinion that a relative

indifference to orthopedic matters on the part of legitimate practitioners is one of the causes responsible for the development of certain cults. However that may be, the importance of orthopedics in general practice as well as in industrial medicine cannot be overemphasized.

There is another branch of clinical instruction which should be singled out for special stress: the laboratory. Allusion to laboratory methods of diagnosis has already been made. To what has been discussed should be added a mention of the need of continuous touch with the objective means of identifying disease, with the procedures common in toxicology, and also with the methods by which the concentrations of noxious dusts, gases, and other agents are ordinarily studied. Industrial medicine places considerable reliance on the laboratory for guidance; the industrial physician must, therefore, be cognizant of the nature of laboratory techniques and of the significance of the findings. Competence in these matters, will mark the difference between progressive and effective preventive programs in industrial medicine, and the static, purely therapeutic and legal concepts which, unfortunately, have not yet undergone complete eradication. There is one caution which should probably be mentioned in interpreting this recommendation. There is no suggestion that the industrial physician be relegated to the position of laboratory technician. He should, however, be capable of understanding the potential contributions of the laboratory and of guiding its activities.

OUR discussion now leads us to the more specialized graduate training which has become indispensable for the industrial physician. Up to this point we have sought to emphasize certain parts of the medical course which will play a particularly direct and vital role in the induction of the physician into industrial medicine. However, no suggestion has been made that the preceding recommendations will, if followed, complete the desired training. The undergraduate years are far too crowded to allow time for the more thorough, deliberate, and delimited study possible after graduation. When this point is reached, the immersion of the physician in the province of industrial medicine becomes complete. He will draw heavily on what he has learned; but he will add to his information and to his skills by contact with the highly specific problems of the industry which employs him. First of all, he will now observe the working environment and develop knowledge of industrial materials and processes and of the hazards which come to the worker from exposure to them. He deals, now, with human subjects whose health, safety, and occupational fitness are his personal responsibility. The extent of this responsibility will impose heavy burdens requiring constant attention. The physician now loses, in a measure, the ready recourse to books, for certain things he must come to know and to evaluate only from repeated, direct and persistent personal contact with them. It is vitally important that he know the character of his plant, the materials used, the processes, and the diseases and safety hazards of the job. This is fundamental as it will render his duties intelligible to him and his work effective. He must develop an intimate knowledge of a variety of subjects. The metals, their multiform assaults on the human economy, and the great complex of symptoms to which they give rise; the dusts, particularly silica and certain of the silicates; the gases, solvents, and fumes with the intricate problems provoked by such members of this group as benzene, the petroleum hydrocarbons, fluorine, chlorine, and carbon monoxide—to mention only a few; the dermatoses, which are far from rare and not an infrequent cause of headache to the physician; that remarkable entity, the industrial back which often threatens to be the proverbial last straw on the back of the harassed doctor; and the ever present hernias concerning which legal gentlemen will probably teach you things utterly baffling to the medical mind and utterly unsuspected by the embryologist, the anatomist and the surgeon. Besides, we cannot omit the occupational neoplasms, electrical injuries, and the disabilities associated with humidity and thermal hazards. The list is by no means complete, but space forbids greater details. And for these conditions, and many others, the physician must, of course, know the pathological findings, the symptomatology, the diagnostic procedures, the therapy, and the prophylaxis. He must be conversant with these matters if he is to escape the pitfalls which will constantly beset his steps. The intricacy of the problems involved is truly great. We may illustrate by giving a few examples, touching on one question alone—that of diagnosis. If, let us say, we confront a patient in convulsions, a worker in a plant where no conceivable noxious exposure could lead to this symptom, we may well run the range of causative factors from apoplexy to general paresis, cerebral tumor, hyperinsulinism, tetany, hysteria, etc. Yet, extended inquiry reveals lead exposure perhaps prior to his present employment and blood and urine study confirms the presence of plumbism. Manganese poisoning may produce such symptoms as a spastic gait, mask-like faces, a low monotonous voice, emotional disturbances such as uncontrollable laughter, cramps and muscular twitchings—among others. These complexities are, perhaps, even more evident when, from one main presenting symptom, a diagnosis must be sought. Take, for example, amblyopia. It may arise from methyl alcohol, carbon bisulfide, lead, mercury and other toxic substances. It may also be congential, or traumatic, or it may be due to hysteria or several other causes.

Now the reader may have met this enumeration of difficulties with unconcern. He may have indulged in the happy reflection that after all these are medical matters and that he, as a physician, will shortly find them part of a familiar and interesting medical venture.

But it must be remembered that the industrial physician is flattered with additional challenges to his abilities. He must be an able administrator. Besides, he must have some knowledge of the law and must, on occasion, adroitly find his way out of the maze of perplexities that opposing counsel will construct about him. These are matters which the physician should realize at an early stage of his industrial career and thereafter keep in mind if he is to avoid the shock of sudden impact with forces to whom medical facts are less sacred than they are to the devotee of science. And this is by no means all. He must be a safety engineer, since the mechanical factors of safety should fall under his control. And he may add much in the elimination of accidents through careful analysis. Then, too, the physician in industry is, without apology, called to function in a teaching capacity. Health education is of basic importance in preventive medicine, and preventive medicine is the ideal function of the industrial physician. He must, therefore, possess or develop the ability to translate all sorts of medical technicalities into lay terms. He must do this in his everyday contact with the worker, in the preparation of articles for publication, and in lectures to a great variety of groups. He must perform this delicate task without

sacrificing scientific accuracy and without compromising his reputation as a physician. There is a recompense, of course, for no group is so receptive to fundamental health facts as industrial workers.

WE HAVE discussed, at some length, the professional qualifications of the physician in industry. We have interspersed these qualifications with mention of the personal characteristics we believe desirable in such a physician. It might be well to terminate this discussion with a brief elaboration of certain traits which have merely been mentioned in passing. These traits, experience has apparently shown, are of crucial importance in the attainment of success. Intellectual ability of more than average order is obviously indispensable when we view the complexities of medicine in general and of any of its special branches—industrial medicine included. To this ability there must be added initiative and energy—traits which are basic in the origination of inquiry into the possibilities for service. The industrial physician should not wait for patients, but should go forth into the areas of potential danger and eliminate the hazards he finds. He cannot do this unless he is actuated by the initiative and the will to action which will make it difficult to find satisfaction except in positive vigorous effort. He must possess, moreover, courage and persistence to follow a desirable course when it offers obstacles or when special interests, through misunderstanding or for other reasons, erect artificial hindrances to progress. He must have high professional skill and must have well developed inclination toward study so that he may keep abreast of scientific developments. He must be committed to the thesis that prevention is the ultimate goal of medicine and that the prevention of disease is even a higher obligation than curative efforts. He must have a sincere interest in people so that he may enjoy their good will. He must be capable of emotional detachment from the vexations of his work, so that he may be able to compose differences on matters of health which occasionally arise between workers and management.

He must face such issues with that intelligent, informed and impersonal approach that will result in the trust and respect of both the management that employs him and the worker for whose benefit he serves. He must, in addition, possess some ability to convey ideas whether in writing or in speech in order that he may effectively reach the many groups with which he must maintain contact. He must possess maturity of outlook, tact and human understanding since his personal relationships must be happy if they are to be productive of the good he seeks to accomplish. He must at all times practice the Golden Rule in his relation with his colleagues. In all matters affecting the health of the community he must take a vital interest.

He must, indeed, be a moving factor in questions of public health, for to safeguard the health of the people is to protect the health of the worker.

These are the qualities of professional background and personal characteristics which are essential for the highest success in industrial medicine. They are precursors to rich and fruitful accomplishment. If it should be said that they are goals to be sought rather than qualifications which are usually found, one may reply that they are in fact both. We may, perhaps, never find them all in one person. We shall, however, find many in any successful physician in industry. Those which we do not find in any given individual remain for that individual goals yet to be attained—goals which when reached will make for a still higher type of service, for a more complete and happier career in this specialized field of medicine.

In closing, I wish to express the belief that our own paths might have been much easier if in our period of training we had been exposed to the fundamentals which I have attempted to present to you. We have all had to develop many of the qualities I have described while engaged in performing our duties as industrial physicians. I believe that through the type of preparation I have tried to outline, we might have been spared some of the difficulties and misunderstandings which we have met in the course of our careers. I cannot help but feel that the suggestions I have taken the liberty of making would bring the future industrial physician to his work with the essential preparation that many of us have had to develop through our own efforts during the course of years.

Bibliography

RAMAZZINI, B.: Diseases of Workers. Translation by Wilmer Cave Wright, The University of Chicago Press, Chicago, 1940.

DODD, W. F.: Administration of Workmen's Compensation. The Commonwealth Fund, New York, 1936.

JOHNSTONE, R. T.: Occupational Diseases. W. B. Saunders Company, 1941.

INTERNATIONAL LABOUR OFFICE: Occupation and Health, Geneva, 1930. Purchase through Baker & Taylor, 55 Fifth Ave., New York City.

MCNALLY, W. D.: Toxicology. INDUSTRIAL MEDICINE, Chicago, 1937.

LANZA, A. J., GOLDBERG, J. A.: Industrial Hygiene. Oxford University Press, New York, 1939.

Small Plant Physical Examinations

IN THEIR article last month* on the small-plant industrial health program of Snap-on Tools Corporation, Kenosha, Wisconsin, MR. H. V. ERICKSON and DR. C. E. PECHOUS state that "500 persons were checked physically." The following are the findings of the physicians making these physical examinations during the period from February 1 to June 20, 1944, on the employees who had been with the company prior to the increase of man-power resulting from the Lend-Lease program and continuing into war production:

I.	Chest rales and questionable lung condition (X-rays have been advised on six of these cases. X-rays were taken, and reports submitted)	13
II.	Heart diseases, including: bradycardia, tachycardia, enlargement, murmurs, degeneration, etc.	23
III.	High blood pressure	7
IV.	Low blood pressure (These employees are over 30 years of age, and have a blood pressure of less than 100)	3
V.	Potential and absolute hernias	41
VI.	Hemorrhoids	48
VII.	Venereal diseases (syphilis)	3
VIII.	Diabetes (Two of these employees did not know they were diabetics)	5
IX.	Generative organs—men and women—(Including hydroceles, enlarged prostates, uterine masses, ovarian cysts, etc.)	28
X.	Varicose veins—moderate and severe	36
XI.	Skin diseases (occupational dermatitis, 14; acne, 8; eczema, 2)	26
XII.	Enlarged thyroid gland	1
XIII.	Employees who either need dental care, or have enlarged tonsils, or gum infections	70
XIV.	Epileptic—very mild form. (He has had but one attack in the past year and a half)	1
XV.	Miscellaneous—one case of each disease: Possible colitis; albumin, 4 plus; chronic abdominal soreness; small mass on right breast; enlarged left posterior auricular gland.	

*Small Plant Industrial Health Program, Snap-on Tool Corporation, by H. V. ERICKSON and C. E. PECHOUS, M.D., INDUSTRIAL MEDICINE, 14:3, 184-188, March, 1945.

Official Industrial Hygiene Services

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DRAMATIC and unprecedented is the story of America's industrial production for World War II. Mountains of materiel for the Armed Forces of the United States and the United Nations pour from the machines—machines operated by men and women, many of whom had never before set foot in a factory. Army and Navy E pennants float over thousands of plants in proof of fulfilled production quotas.

Behind these near-miraculous achievements of industry are the struggles and problems of management and labor. These are many and varied, but important among them is the problem of industrial health—control of occupational diseases and disabilities resulting from the environmental conditions, materials, and processes of industry.

As a result of research and experience, solutions are known to most of the industrial health problems which can disrupt production and which constitute the source of a very costly loss of time and skill in the American economy. The responsibility for assisting industry in the application of the measures lies with the official State and local industrial hygiene services in the country. The extent to which these agencies have been able to discharge their responsibilities is the subject of this report.

The report summarizes direct services received by 23,685 industrial establishments employing over nine million workers. It is an accounting of the field work performed by all but one of the 44 official units actively engaged in industrial hygiene work during the two-year period July, 1942, through June, 1944. Most of the information is based on reports of individual plant investigations submitted by the units to the Industrial Hygiene Division, U. S. Public Health Service. A voluntary system of uniform reporting, developed at the request of and with the assistance of the National Conference of Governmental Industrial Hygienists permitted the collection of these data. Similar reports covering the work of a limited number of units have been published,[1] but this is the first time that a virtually nation-wide report has been possible.

Availability of State and Local Services

WHEN it is realized that there are more than 52 million civilian workers in the nation's labor force, and that 43 million are engaged in non-agricultural pursuits, the organization responsible for health conservation of the working groups is by comparison unimpressive. Altogether there were 47 industrial hygiene units, equivalent to bureaus or divisions, in 38 States, but owing to personnel shortages only 44 were active during the reporting period. The 47 units were located in the following branches of State and local government: 36 units in State departments of health; one unit in a State department of labor; one unit functioning from both State health and labor departments, and another from State labor and city health departments; six units in city health departments; and two in county health departments.

Some 300 professional personnel consisting chiefly of physicians, nurses, engineers, chemists, and sanitarians gave 41,975 different services. This includes 60 persons on assignment from the Industrial Hygiene Division, U. S. Public Health Service, in States where stringency of war conditions required the assistance of the Federal government. The amount budgeted for industrial hygiene activities during this period was slightly over two and one-half million dollars. One-half of this amount was derived from Federal grants-in-aid, and the remainder from State and local funds.

Working programs of most individual units are varied in scope, but, in a number, they are limited chiefly to an engineering and chemical service. Shortages in trained personnel and facilities associated with demands of war, and the comparative newness of the consultant services such as industrial nursing and dentistry, are among the reasons for this. Direct engineering and chemical services in the prevention and control of occupational health hazards are the only services given uniformly by all units. Thirty-six units had physicians and 25 had nursing consultants on their staffs at some time during the reporting period. Four States had either full or part-time services of dental consultants, and one State had a nutritionist on its staff for a year. This effects a limitation on the availability of such services in the country.

Some limitations in personnel and facilities have been compensated for through the establishment of working relationships with other divisions in the State government. For instance, in addition to receiving personnel on assignment from nursing, dental and other divisions, the industrial hygiene units work with health education divisions in the preparation of materials for dissemination among workers and in the community. They work with divisions of tuberculosis and of venereal disease control in promoting case finding programs in industry.

Some States have agreements with departments of labor and industrial accident commissions whereby they obtain reports of occupational disease claims which they use as a basis for their work. A few States have reciprocal agreements with State labor departments for investigating conditions causing occupational illness or for checking on recommended improvements. Still other units work with State and local councils on industrial health of the American Medical Association, and with State committees on nutrition of the War Food Administration.

And finally, the program of each unit is closely integrated with the nation-wide program for promoting and conserving the health of workers, under the guidance of the Industrial Hygiene Division, U. S. Public Health Service. Technical services are assured in "must" industries brought to the attention of the units by the War Manpower Commission and other Federal agencies, where working conditions are alleged to be responsible for production lags and manpower difficulties. Thus investigations in asbestos textile industries, chromium ore reducing plants, and aluminum foundries were made by the units for these reasons.

In addition to assignment of personnel, the Industrial Hygiene Division lends necessary laboratory and field equipment; performs difficult laboratory analyses; trains personnel for work in the States; gives consultation services in all specialized fields of industrial health; and gives actual assistance in investigating plant conditions where indicated.

Industries Receiving Services

THE variety of industries receiving industrial hygiene services is a small indication of the scope and complexity of health problems encountered because of processes, operations, and materials in use. They included 23,685 industrial establishments, employing slightly over nine million workers, located in 34 States

1. Last report published covered the period July, 1941, to June, 1942. See "Activities of State and Local Industrial Hygiene Services in a War Year," by VICTORIA M. TRASKO. Public Health Reports, 58: 904-915, June 11, 1943.

which include all but two of the highly industrialized States in the country. Eight million of the workers and 88% of the establishments serviced were engaged in the manufacturing industries. Both private and government-owned plants were serviced.

According to the estimates of the Bureau of Census, there are at present 12,500,000 wage earners in the manufacturing industries in the country. On this basis, one may assume that close to two-thirds of the workers in such industries were reached during the two-year period, with various services of official industrial hygiene units. One-half of these plants and three-fourths of the workers were in industries manufacturing durable goods such as transportation equipment and accessories for the armed forces, ordnance materiel, radio equipment, machinery, lumber products, and stone, clay and glass products. The remaining plants were engaged in the production of non-durable goods such as textiles, food products, chemicals, rubber, and petroleum products.

The non-manufacturing industries included metal and coal mines, quarries, a few construction projects, retail establishments, transportation and other public utilities, repair shops, laundries and dry cleaning establishments, garages, office buildings, and vocational schools.

The plants serviced varied tremendously as to size, ranging from a granite shed employing as few as three workers with potential silica exposures, to large aircraft plants and shipyards employing over 50,000 workers each and with countless health hazards. Eighty percent of the plants serviced employed less than 500 workers each and accounted for 15% of the workers; plants employing over 2500 workers accounted for 5% of all the plants and 6% of the workers. The remaining 15% of the plants and 24% of the workers were in plants employing from 500 to 2500 workers.

Services Provided to Industry

INDUSTRIAL HYGIENE units aid industry in an infinite number of ways in recognizing, evaluating, and controlling health hazards associated with the working environment and in promoting and improving medical, nursing and related health services for workers. These services are customarily identified as inspections, surveys, studies, and consultations. The extent to which they were given during the two-year period is summarized in Table 1. The table shows the number of different plants receiving services, the number of such services, and the number of industrial hygiene units reporting. It also includes a summary of miscellaneous items of work performed in connection with or on the occasion of visits to the plants.

Altogether, the 43 units reported 41,975 different services given to 23,685 plants during the two-year period. This is on the average of more than one service per plant, but actually two-thirds of the plants received one service each.

Inspections, general surveys, medical surveys and follow-up work were the most frequent types of services reported from the standpoint of number of plants and the number of such services. All 43 units reported inspections, general surveys, and quantitative studies of the workroom environment. While all units do some checking on compliance with recommendations, reports on this work were received from 38 units. Fewer units, chiefly because of unavailability of personnel and in some instances incomplete reporting, reported medical studies and consultant services regarding the different phases of plant health services. The large number of medical surveys reported is accounted for mainly by the work of one unit.

TABLE 1.
TYPE OF SERVICE PROVIDED TO INDUSTRY DURING THE TWO-YEAR PERIOD BY 43 INDUSTRIAL HYGIENE UNITS

Type of service given	Number of plants in which service was given	Number of services	Number of units reporting
All plants serviced	23,685	41,975	43
Inspections, complete or limited	7,611	9,608	43
Surveys—general	6,436	6,954	43
Surveys—medical only	6,867	6,996	13
Quantitative studies of workroom environment	2,912	3,505	43
Medical studies of workers with symptoms of illness	442	486	17
Consultations on:			
Medical services	1,608	2,310	28
Nursing services	1,760	1,919	20
Dental services	93	104	4
In-plant feeding facilities	243	255	7
Engineering control of hazards	2,696	2,764	23
Mass chest x-rays of workers	523	527	12
All other	128	135	5
Follow-up on compliance with recommended improvements	4,178	6,412	38
Miscellaneous:			
Laboratory determinations of air, materials, substances		43,000	43
Field determinations of atmospheric contaminants and physical conditions		32,000	35
Plans for ventilation and other control equipment examined		3,271	4
Chest x-rays taken in connection with compensation cases		5,619	3
Workers examined		14,536	15

Inspections, Surveys, and Studies

AS A RULE the 9,608 inspections shown in Table 1 were made upon initial or routine contact with the plant and refer to observation tours of part of or the entire plant. They include investigations of complaints of insanitary conditions, and all other investigative services not involving detailed technical work.

Through the 6,954 general surveys, the industrial hygiene units evaluated the extent of health and safety provisions in the plant, the nature of occupations and exposures, and the control measures in use. This was the usual type of service extended to war plants with government contracts, and to series of like industries such as foundries, granite sheds, machine shops where over-all health problems were scrutinized and needs ascertained. These surveys also served as a basis for determining whether further detailed studies of potential hazards should be made.

The 3,505 quantitative studies of the workroom environment were made to determine for industry the extent and magnitude of health problems resulting from exposures to dusts, vapors, gases, and other atmospheric contaminants, and the effectiveness of ventilating and other control equipment.

These studies required the use of special laboratory and field equipment such as dust collectors, gas and vapor detectors, and special equipment for chemical analyses. The units were thus able to determine whether materials being handled were injurious to the health of workers; whether concentrations of such poisonous substances as lead, nitrous fumes, carbon monoxide, and carbon tetrachloride found in the worker's breathing zone or in the entire workroom were in excess of recognized safe limits. They determined whether control measures such as a lateral exhaust ventilation over a plating tank or the dust collecting system in a sand-blast room were effective, and whether toxic gases and vapors were being carried away from the workroom so as not to cause illness in workers.

In connection with these studies the units performed 43,000 dust counts, tests, and examinations on materials and substances in the laboratory. All units do

not keep count of the tests of atmospheric contaminants and of physical conditions they do in the field. The report of 32,000 such tests by 35 units is therefore a small fraction of the actual number of field tests made.

These include measurements of temperature, humidity, air motion, radiation, illumination, and noise in an effort to determine the extent of the hazard and how it can be controlled. The units were frequently faced with the problem of developing sampling methods and analytical techniques, particularly when less known substances and substances in new forms were encountered. As an example mention might be made of plastic materials in the form of dust, paint, glue, and in molten states.

Four units reported examinations of 3,271 plans and specifications for ventilation and other control equipment submitted by industry for approval prior to construction and installation of equipment. Two of the units are required by law to make such examinations. The other two units perform this service upon direct request from industry. Engineers in a few of the units also draw plans and designs for standard ventilating equipment but the actual extent of such services is not known.

The 486 medical studies were made chiefly in conjunction with engineering studies in an effort to ascertain the relation of the occupation to the illness. They involved medical examinations of workers showing symptoms of illness and clinical laboratory tests. Most of the 14,536 physical examinations reported were made for this purpose, others being made in connection with the obtaining by workers of certificates of availability for the War Manpower Commission.

Health Problems Investigated

THE specific health problems arising out of the workroom environment which the industrial hygiene units assisted in controlling are too numerous for listing. They include problems associated with such common operations as welding, degreasing, spray painting, plating, sand-blasting, plasticizing, mining, and smelting. They include many processes associated chiefly with production of war materials and substances whose toxicity has heretofore not been explored. Among those encountered by the units during their studies were solvents and dopes, used in aircraft manufacture, whose threshold limits had not been accurately determined or whose toxicity was unsuspected until actual illness occurred; the silica hazard in quartz crystal cutting operations; the painting of aeroplane dials with radioactive compounds; and impaired hearing resulting from noise in riveting and from noises associated with increased factory production.

The studies include medical and engineering investigations of outbreaks of illness such as dermatitis among workers handling impregnated cloth for army tents; among machinists handling bombs and shells coated with a fluoride compound; and among workers exposed to phenol formaldehyde glue in manufacture of plywood. Outbreaks of dermatitis and systemic illness resulting from the use of chlorinated naphthalene and diphenyl compounds, as during cable coating operations, were studied in several plants. In another plant a detailed study was made of "grasping injury," an affliction of the hands and arms chiefly among women who have been welding, drilling, or riveting. A study in a shipyard revealed that irritation and systemic effects among welders were caused by exposure to cadmium which management did not know had been substituted for zinc.

There were occasions when industry requested assistance because illness or fear of illness was causing production loss and manpower difficulties. For example, in one plant, production was cut 50% because dermatitis disabled workers handling a product made by laminating two layers of heavy glass cloth with a synthetic formaldehyde resin. In a plant manufacturing parachutes, production was interrupted when all workers in the plant became ill. An investigation requiring the services of the entire industrial hygiene staff showed that the illness was due to inhalation of carbon tetrachloride used for cleaning soiled spots on the chutes. Another plant had to be shut down completely while the source of carbon monoxide poisoning was being investigated.

The studies also include special investigations of deaths of 33 workers alleged to have been caused by their occupation. One was caused by a prolonged exposure to high concentrations of cadmium, another to silica dust. Two deaths were caused by working with solvents of unsuspected toxicity; two were attributed to halowax, two to arsenic, two to trichlorethylene, two to other solvents, three to welding fumes, one to chlorinated naphthalenes, four to gases and two to TNT. Eleven others arose out of the occupation but were accidental in nature. These were due to oxygen deficiency in a butadiene storage tank; to an explosion caused by ignition of a large volume of hydrogen gas accidently released into the workroom; explosion of metallic flare powder, and of various gases.

POLLUTION CONTROL—Another type of problem which has increased since the war concerns complaints from neighborhoods and adjoining plants regarding atmospheric and stream pollution. Objectionable odors, nuisance dusts liberated because of faulty control measures at the source, and disposal of mill waste products into streams, have caused many disturbances in towns and cities. While some of these conditions cause respiratory irritations, many fall into the nuisance class and are harmless. In one instance, a synthetic rubber plant was closed by the local board of health until noxious odors had been controlled. Other types of industries commonly at fault include oil refineries, chemical and fertilizer plants, textile mills, cotton seed refining mills, and paper mills.

NON-OCCUPATIONAL DISEASE CONTROL—Most of the work of the units is in the field of occupational disease control, but it is not uncommon for industry to call for help in outbreaks of non-occupational illness. The most notable instance is epidemic keratoconjunctivitis, an infectious eye disease, which first appeared among shipyard workers on the Pacific coast and spread to other sections of the country. Other instances include an epidemic of Vincent's angina, numerous outbreaks of food poisoning and gastro-intestinal disorders, control of typhoid fever and scarlet fever contacts, and influenza epidemics.

In one State, the presence of two workers who were small-pox contacts threatened an outbreak of small-pox in manufacturing plants. As a result the unit formulated and carried out a program which resulted in the vaccination of more than 50,000 persons employed in war plants. In another State, rumors that some workers had syphilis were causing a serious manpower problem, and the fears of the workers had to be allayed before production was resumed.

Consultation Services

AS A RULE, interviews were held routinely with plant officials when making inspections, surveys, and studies. However, there were many occasions when the purpose of the visit to the plant was primarily to

consult with medical personnel and other plant officials. These were tabulated separately and classified according to the field of health service discussed.

According to Table 1, consultations on engineering control of health hazards, medical services, and nursing services were reported in more plants and more frequently than on dental services and in-plant feeding facilities. The 2,764 consultations on engineering control of health hazards classified frequently resulted in other services but had to do primarily with giving advice on equipment, engineering problems, and use of toxic materials.

The promotion of dental services for workers is still in the early stages of development and, as may be observed from the table, was reported as an activity of four units. Most of the units were in a position to assist industry with in-plant feeding problems, but only seven units reported any activity in this field of work. In general, these activities were carried on in cooperation with other divisions in the State government or with local committees on nutrition in industry.

The promotion of tuberculosis case-finding programs in industry is an activity undertaken in cooperation with State divisions of tuberculosis. Reports from 12 units show that 523 plants have been visited for this purpose. The actual number is probably much higher, since several units did not report their cooperative activities. More than 500,000 chest x-rays of workers were taken as a result of their efforts. Two States have their own x-ray equipment, and the taking of chest x-rays of workers constitutes their major activity. As a rule, the units promote the idea to industry, make the necessary arrangements for taking the films, and, at times, follow-up to ascertain treatment of workers.

In addition, three units reported the taking of 5,619 chest x-rays of workers in dusty trades in connection with compensation for silicosis.

The 2,310 consultations on medical services shown in Table 1 took in a wide scope of subjects, and included actual assistance with planning and establishing or reorganizing plant medical departments. Sometimes it was a matter of persuading management of the value of a complete plant medical program, particularly the inclusion of pre-placement physical examinations. Other times, the units assisted with procurement of medical and nursing personnel, set up record systems, analyzed sickness absenteeism records, and drew up plans for dispensaries. They furnished advice on the diagnosis, treatment, and prevention of specific occupational illness, particularly skin diseases, and formulated policies with regard to employment of handicapped workers and returning veterans. Since most of the plants serviced were of small size, improvement of first-aid facilities and the training of first-aid workers were common problems.

The 1,919 consultations on nursing services listed in Table 1 refer chiefly to the work of nursing consultants of industrial hygiene staffs, in the promotion and improvement of nursing services in industry. Assistance was given with organization of nursing services, the procurement of personnel, and with such special problems as standing orders for nurses, record keeping and preparation of reports, improved treatment techniques, utilization of community health facilities for workers, and health counseling with individual workers and groups. Consultants promoted part-time nursing services in the smaller plants, and were instrumental in improving the calibre of first-aid services and in replacing many first-aid services with complete nursing services.

To what extent nursing services in industry have been improved cannot be exactly determined. It is obvious from requests for increased educational opportunities for industrial nurses, and the increased number of organized groups of nurses, that much has been accomplished toward the improvement of the standards of nursing practices in industry.

Improvements Recommended to Plant Management

UPON completion of plant investigation, it is customary for the industrial hygiene units to submit to management a report of pertinent findings and, when indicated, recommendations for the correction of existing health hazards and improvements in health services. The extent to which recommendations were issued and reported as carried out during the two-year period by 41 of the 43 units is shown in Table 2. One or more types of improvements were recommended in 7,630, or 40% of all plants serviced, covering 2,173,396 workers, or 29% of all workers employed in these plants. They were reported as carried out by management in 56% of the plants and for 42% of the workers thus affected.

Improvements in the working environment were recommended in 35% of the plants serviced and affected 12% of the workers, whereas improvements in medical, nursing and related health services were suggested in 8% of the plants and affected 20% of the workers. The number of different recommendations is quite large, for many times several recommendations were issued for the control of one hazard or affecting the same workers. As a rule, fewer workers are affected by specific engineering improvements, but recommendations of this type were more common. While all 41 units reported recommendations for improvements in the working environment, only 31 units reported recommendations regarding improved health services.

As to the specific improvements recommended, those dealing with installation, design and improvement of

TABLE 2.

EXTENT TO WHICH IMPROVEMENTS IN PLANT CONDITIONS WERE RECOMMENDED TO MANAGEMENT AND REPORTED AS CARRIED OUT. BASED ON REPORTS FROM 41 UNITS

Plants serviced by 41 units 19,271
Workers employed in plants serviced 7,465,142

	Number of plants	Number of workers involved	% of all plants serviced	% of all workers employed involved
RECOMMENDED:				
All types of improvements[1]	7,630	2,173,396	40.	29.
Improvements in working environment including personal protective measures	6,686	884,368	35.	12.
Improvements in medical, nursing and related health services	1,582	1,496,093	8.	20.
	Number of plants	Number of workers involved	% of plants in which improvements were made	% of workers involved in improvements recommended
CARRIED OUT:				
All types of improvements[1]	4,272	911,927	56.	42.
Improvements in working environment including personal protective measures.	3,889	473,902	58.	54.
Improvements in medical, nursing and related health services	615	541,496	39.	36.

[1] This covers unduplicated totals for plants and workers. Both types of improvements shown were made in certain plants.

local exhaust ventilating systems and other equipment for controlling air contaminants were made in about one half of the plants, affecting slightly more than one-fourth of the workers. Improvements in plant housekeeping and in sanitation were likewise made in about one half of the plants but affected close to 60% of the workers. Next in frequency were recommendations from the standpoint of personal protection of workers, in regard to protective clothing of all kinds, especially for the prevention of skin diseases, respirators, personal hygiene, and education of the worker regarding the hazardous nature of his job. These were made in about one-third of the plants and affected about 20% of the workers. Made less frequently were recommendations for substitution of working materials of less toxic nature, alteration of manufacturing processes or equipment, sufficient or proper illumination, abatement of noise, and elimination of crowding. Six units made recommendations for the elimination and reduction of accident hazards.

By tradition, accident prevention is a function and a responsibility of State labor departments and industrial accident commissions. However, whenever industrial hygiene personnel observe gross violation of good practice in the field of accident prevention, attention is called to these conditions, and in most instances, the matter is referred to the labor department for follow-up.

The most frequent types of improvement in health services suggested were those dealing with medical programs and nursing services. Specific recommendations made were similar to the topics discussed under consultation services. Comparatively few recommendations were made regarding dental, nutritional, and similar services for workers. This is to be expected, since specialized health programs are practical only in the larger plants. Another reason for the comparative scarcity of this type of advice is the lack of personnel in the industrial hygiene units qualified to make such recommendations.

Not only were more recommendations made for improvements in the working environment than for development of health services, but more compliance with recommendations of the former type was obtained. Corrections in working conditions were reported in 58% of the plants and for 54% of the workers for whom they were made, whereas the corresponding percentages for improvements in medical, nursing and related health services were 39 and 36 respectively. A disparity of this kind is not unnatural. Management will attempt to control actual working conditions causing illness involving lost time and compensation costs, whereas improvements in health services, the direct benefits of which are not as tangible, are likely to be postponed or not carried out.

On the whole, compliance with recommendations is better than the percentages seem to indicate. Considering the lapse of time before improvements can be made by managment and reports of such compliance obtained by the units, compliance in 75 to 80% of the plants is about the maximum to be expected over a prolonged and definite period of time. In view of this, corrections reported in 56% of the plants in which they were issued may be regarded as good. Personnel shortages coupled with requests of war plants for immediate aid limited the extent of follow-up work of many units. A small percentage of non-compliance was due to inability or refusal on the part of management to make the improvements because of lack of materials and the temporary nature of processes. Inability to obtain WPB priorities for ventilating equipment and other high priority materials probably was another factor.

How Services Were Initiated

AS HAS been said, the primary function of industrial hygiene units is to give direct technical services to industries in order to prevent and control occupational diseases. Many of these services have to be initiated by the units themselves since all industries are not acquainted with the availability of industrial hygiene services in their State. For this reason, 48% of the 41,975 services were found to be initiated by the units themselves.

Eleven percent of the services comprised a State-wide survey of medical facilities in plants inaugurated at the request of the medical profession. Fifteen percent were follow-up investigations to check on compliance with recommendations. This proportion is comparatively low partly because of incomplete reporting, and partly because in some States reports of compliance were obtained by letter and telephone. Two percent were investigations of official reports of occupational diseases made chiefly by five units. The remaining 15% of the services were given in response to requests.

Recognition of the need and value of industrial hygiene services is attested by the fact that 43% of the requests for service came from management, 31% from State labor authorities, and 9% from labor unions, employees and complainants. Other State and local health agencies accounted for 10% and Federal war agencies for 4% of the requests. The remaining 3% originated from insurance companies, private physicians, contractors, and unofficial agencies.

The types of services most commonly self-initiated were inspections, surveys, and consultations dealing with the promotion and evaluation of health services. Quantitative studies of the workroom environment and medical studies were most frequently requested, particularly when assistance was needed to control specific problems interfering with production.

Occurrence of Occupational Diseases in Industry

IT IS AN accepted fact that reporting of occupational diseases is notoriously poor, and as a result, available data on the occurrence of occupational diseases in industry are meagre.

There are at present 25 States with regulations requiring occupational diseases to be reported to either health or labor authorities. Industrial hygiene units are located in all but two of these States. There is much that the units can do towards stimulating the reporting of occupational diseases, but for various reasons this function has not been exercised to the fullest.

Two sets of figures were collected which throw some light on the occurrence of occupational diseases in industry during the reporting period. One set consists of reports of 9,017 cases of occupational diseases, including 33 deaths, which were investigated or revealed upon investigation in 1,405 plants by 30 industrial hygiene units in 26 States. The second set consists of official reports of 50,337 cases to health and labor authorities in 11 States. Both sets of figures are far from complete, and include confirmed, suspected, and alleged cases of occupational illnesses. In several instances tabulations as to kinds of disease were not obtained. However, these data, inadequate as they may be, are presented with the thought of giving some indication of the prevalence of occupational illnesses and of the need for improved diagnoses and reporting.

The accumulated data are summarized in Table 3 which shows the number and kinds of cases investigated, the number of plants in which they occurred, and the number and kinds of cases reported to health

and labor authorities. There is relationship between investigated cases and reported cases, but the extent cannot be determined. Reported cases include official reports of such cases to health departments in eight States, and of claims for compensation or compensated claims in three States. Needless to say, reports of claims for compensation far exceed reports of physicians to health departments.

Based on available classifications of kinds of disease, it may be observed from the table that 4,455 investigated cases and 21,244 reported cases were dermatitis of some kind. These numbers correspond to 53 and 65% of all cases classified, and in general are in agreement with other reports of the incidence of industrial dermatoses. The 1,336 investigated cases of systemic poisonings correspond to 16%, whereas the 2,233 reported cases make up only 7% of all cases.

The tabulations of other cases should be regarded with interest only, for they cannot be interpreted as reflecting the comparative incidence of such illnesses in industry. Aside from the fact that reporting is poor, a great deal of variation exists from State to State in reportable and compensable diseases. Another reason is indefiniteness of diagnoses as revealed by some reports. This also confirms the prevailing opinion that many physicians are unacquainted with the etiology of occupational diseases.

Likewise, the investigated cases are not representative of the occurrence of occupational diseases in the 805 industries. In the first place, they consist of sporadic reports of cases leading to investigations, or which were revealed on investigation. In the second place, not all units have medical personnel who can make or confirm diagnoses of occupational illnesses. And finally, it was often difficult to ascertain accurately the exact number of cases, particularly, from the not-infrequent reports which state, "At least 1,000 cases of conjunctivitis are occurring each month"; or "All workers in the plant have had tetryl dermatitis at some time or other."

TABLE 3.
OCCUPATIONAL DISEASE CASES INVESTIGATED IN PLANTS SERVICED AND CASES REPORTED TO OFFICIAL AUTHORITIES. (NOTE: RELATIONSHIP BETWEEN CASES INVESTIGATED AND CASES REPORTED IS INDETERMINATE.)

Kind of disease	Cases investigated by 30 units in 26 States		Cases reported in 11 States
	Number of cases	Number of plants	
All cases	9,017	1,405	50,337
Cases not classified as to kind	687	600	17,694
Cases classified	8,330	805	32,643
SYSTEMIC POISONING due to:	(1,336)[1]		(2,233)[1]
Metals:			
Arsenic	3	3	8
Cadmium	6	2	7
Lead	94	43	345
Mercury	8	3	11
Radium	5	1	8
Welding fumes	10	7	324
Zinc	447	15	114
All other metals	6	4	28
Solvents:			
Benzol	5	5	149
Carbon tetrachloride	332	17	168
Trichlorethylene	19	18	5
All other solvents	25	16	147
Gases:			
Carbon dioxide	148	20	154
Chlorine	31	7	21
Hydrogen sulfide	3	1	9
All other gases	29	18	65
Dusts:			
Silica	71	19	279
All other pneumoconiosis producing dusts	45	8	243
All other causes:	49	26	148
DERMATITIS due to:	(4,455)[1]		(21,244)[1]
Alkali	89	10	1,065
Chemicals, dyes, inks	80	36	1,756
Chrome and its compounds	84	26	241
Food products	159	18	1,220
Metals	75	12	639
Oils (chiefly cutting)	1,871	154	4,989
Organic dusts	70	13	296
Plants	20	2	661
Solvents	189	66	1,297
Synthetic resins	570	46	233
Tetryl	366	4	161
All other and not specified	882	149	8,686

Kind of disease	Cases investigated (by 28 units)		Cases reported in 11 States
	Number of cases	Number of plants	
CONJUNCTIVITIS due to:	(2,241)[1]		(4,639)[1]
Welding flash	2,020	55	3,506
All other	63	25	806
Epidemic keratoconjunctivitis	158	9	327
RESPIRATORY AFFECTIONS:	(22)		(726)
Pneumonia	2	2	14
Tuberculosis	—	—	132
All other	20	8	580
ANTHRAX	23	12	6
HEAT EXHAUSTION	32	6	63
IMPAIRED HEARING	4	2	28
INFLAMMATORY INFECTIONS	125	33	2,747
NASAL PERFORATIONS AND ULCERS	28	7	40
OCCUPATIONAL HERNIA	—	—	272
UNDULANT FEVER	6	2	21
ALL OTHER	58	7	624

[1] Figures in parentheses are subtotals.

Summary and Conclusions

AN ACCOUNTING of the major types of services given to industry by State and local industrial hygiene units has been presented, covering the work of 43 of the 44 units actively engaged in industrial hygiene work in the nation during the two-year period July, 1942, through June, 1944.

Some 300 professional and technical personnel in these units gave 41,975 different services to 23,685 plants employing nine million workers and located in 34 States. These services were investigative, technical, and consultative in nature, involving actual performance in the plant. They were given to assist industry in assuring its workers healthful working conditions, and in maintaining and improving the health of the workers themselves.

In the determination of the extent and degree of hazards, this personnel performed 43,000 tests of materials and substances in the laboratory, and 32,000 tests and measurements in the field. They performed medical examinations of 14,536 workers with symptoms of occupational illness or in connection with issuing certificates of availability for the War Manpower Commission, and took 5,619 chest x-rays of workers in dusty trades. They investigated 9,017 cases of occupational diseases, including 33 deaths, alleged to have been caused by conditions in the working environment. Improvements in the working environment and in health and medical services were recommended in 40% of the establishments serviced and for 29% of the workers employed in these establishments. Compliance with recommendations was reported in over half of the establishments in which they were made.

Considering limitations in personnel and facilities, the scope and the extent of these services represent the peak load the units could carry in this period. War industries were given priority, but it was not always possible to reach all war industries in a State because of shortages in personnel, equipment, and other facilities, and the distances to be traveled. It is obvious that the services of a unit consisting of a physician, engineer, and a chemist in a State with a half million workers will necessarily be limited.

The summary indicates that during the past two years industrial hygiene units have made some progress in furnishing consultant services in the specialized fields of industrial nursing and dentistry. More working relationships have been established with State and local agencies and particularly with war agencies. Because of other demands for service, some units necessarily curtailed follow-up work to check compliance with recommendations.

Although an over-all review indicates that the 43 industrial hygiene units have discharged their responsibilities to their utmost, it also points to the needs in this field of public health. Considering the size of the nation's industrial manpower and the magnitude of health problems in industry, the organization now developed to carry on industrial hygiene work is far too small. The great need is still for more professional and technical personnel. Since war demands preclude the possibility of obtaining such persons from the usual sources, facilities for training other persons with partial qualifications should be provided. This means increased budgets and working facilities to support an increased organization.

In order to assure broader and quicker coverage of industries, there is a need for establishing minimum industrial hygiene services in the 10 States without any provision for such services, and for decentralization of those units in States which now have only one central office.

Practically no progress can be reported over the past few years in the promotion of occupational disease reporting. The comparatively small proportion of investigations of reports and claims for compensation for occupational illness reflect strongly the need for broadening and strengthening this phase of the program.

Finally, there is need for all industrial hygiene units to strengthen and to build up their resources in order to cope effectively with the problems resulting from cessation of war activities and the transition to peacetime activities. These include not only the health problems associated with changes in manufacturing processes, but also the broad phases of adult health conservation. The health problems of veterans finding themselves at work again or for the first time, and of rehabilitated workers, will offer many challenges to those concerned with industrial hygiene work.

Carbon Tetrachloride Poisoning in Industry

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THE excellent properties of carbon tetrachloride make its use in industry very attractive. It is natural, therefore, that the dangers inherent in using this toxic material are often overlooked. That these dangers really exist is well brought out by numerous reports of fatal poisoning and the cases here reported should serve to remind industry that unceasing care is necessary if carbon tetrachloride is to be used safely.

Carbon tetrachloride may produce toxic effects through skin absorption, ingestion, or by inhalation of the vapor. The type of absorption is unimportant except that the acute poisoning almost always results from ingestion or from the breathing of an atmosphere highly contaminated by the vapor of carbon tetrachloride. Fatal poisoning has been reported following a single exposure to a high concentration of the vapor, and this paper points to at least one more such death.

The exposure occurred during an operation involving the cleaning of warm surfaces that was being carried out in a large building 68 feet by 96 feet. The ceiling height varied from approximately 11 feet at the sides to a peak of 26 feet in the center of the building. There were 2000 square feet of window and door space and 10, 24-inch, round roof ventilators. Most of the doors and windows were closed because of the weather but the ventilators were open. There were 110 employees in the building but a relatively small percentage were employed in direct handling of carbon tetrachloride. Anti-tank mines were brought into the building for cleaning, painting and packing. Considerable trinitrotoluene spilled on the outside of the mine during filling, and it was necessary to remove that material prior to painting. Acetone was the solvent ordered for the job, but during this particular shift the supply of acetone had been exhausted and approval had been given for the use of a paint thinner or naphtha to be substituted for acetone. The operation consisted of dipping a rag or brush into the solvent and applying it directly to the hot mine. The temperature of the mine was sufficient almost instantly to vaporize the solvent but was not high enough to produce phosgene. The mine was then passed on to other employees for more wiping and cleaning. From here it went to a paint booth for spray painting and drying prior to packing in metal crates. The spray paint booth was the only mechanical ventilator in the building and it had fans moving about 1500 cubic feet of air per minute. The paint booth was located about 20 feet from the solvent operation. Carbon tetrachloride had been approved for the cleaning of certain presses within the operating area and orders had been issued to allow this material to be brought into the building for that specific operation. Through error carbon tetrachloride was brought to the employees by a colored maid in place of the paint solvent. About eight gallons were used in a period of less than two hours. About 20 people handled the solvent, 24 employees were adjacent to the solvent and handled the mines next, and 66 men and women were in the room but not directly exposed to the vapors. The exact concentration of the vapor is not known, but under similar circumstances the concentration of acetone has been recorded as over 2000 p.p.m.

Shortly after the change to carbon tetrachloride, several of the employees became nauseated, and one after another they had to stop work to go to the door for fresh air. Later they complained of feeling drunk, and all of those finally went to the first aid station where they complained to the nurse of nausea, dizziness and headache. Only one of the patients felt badly enough to lie down for an hour or two, and all of the employees continued their work through the rest of the shift. Other complaints consisted of a sense of faintness, vomiting, cough, cramping pain in the abdomen, and everyone objected to the odor of the material. Unfortunately, there was a change of nurses in the middle of this shift so that each nurse saw only part of the patients and the first nurse failed to report the occurrence of these cases to the relieving nurse. They both explained their failure to report these cases as being due to the fact that the occurrence of these symptoms had not been too uncommon among employees handling acetone in this manner.

After completing the shift the employees went home in the usual way, but the following day they became much worse, with nausea and vomiting their principal complaints. Some had dizziness and weakness and two of the patients lost consciousness for short periods. The exposure occurred on a Thursday night and the first patients reported to their physician on Saturday.

One of the patients was taken to a hospital on Monday and died shortly after arrival. She had had a good urinary output, and a urinalysis in that hospital was reported as showing no abnormality. A partial autopsy on that patient showed a grossly enlarged liver but the weight was not recorded. Sections from the liver showed almost total necrosis. The destruction was uniformly a central necrosis and extended out to involve all of the lobule except a thin zone of cells at the periphery. Even these cells at the periphery showed severe degeneration change. There was no evidence of regeneration and no cellular inflammatory reaction.

The plant medical department was notified for the first time on Monday at which time several of the patients were sent to us. An effort was then made to locate everyone who had worked at that time and all sick employees were brought to our hospital. Six seriously poisoned individuals were hospitalized. All of these patients were vomiting when brought in and were quite dehydrated.

One of these patients appeared near death when she arrived. She was semiconscious and talked at random. This case was deeply jaundiced and her liver was felt below the umbilicus. The high points of this patient's laboratory examinations during her hospital course are listed below.

Icterus Index	344
Hangar Cephalin Flocculation Test	////
N. P. N. (Blood)	68.5
Urinary Urobilinogen	Absent
Urinary Bile	////
Urinary Albumen	///
Red Cell Count	2,430,000
Hemoglobin	8 gm.
Normoblasts	3 per 100 white cells
White Cell Count	18,400
Polymorphonuclears	90%
Lymphocytes	5%
Eosinophiles	1%
Basophiles	1%
Monocytes	3%

This patient improved rapidly during treatment and left the hospital after only 16 days. She has since been followed for several months and shows no residual effects of the intoxication.

Another of our patients continued to be nauseated in spite of treatment and gradually developed a generalized edema and oliguria. This case was not severely jaundiced. On her fourth hospital day she complained of headache, persistent hiccough and abdominal cramping. The following day she had two convulsions. She developed incontinence of urine and feces and had more convulsions on the next day. Her outstanding laboratory data are outlined as follows:

N. P. N.	377.8
Icterus Index	16.8
Hangar Cephalin Flocculation Test	////
Red Cell Count	3,910,000
Hemoglobin	13.3 gm.
White Cell Count	10,200
Polymorphonuclears	75%
Lymphocytes	20%
Eosinophiles	2%
Basophiles	2%
Monocytes	1%

The urine showed //// albumen, numerous casts, pus cells and red cells. This patient had considerable vomiting and diarrhea throughout most of her illness. Improvement was rapid and the patient left the hospital in slightly over two weeks. Follow-up studies show normal laboratory tests and a clinically well patient after several months.

The remaining four hospitalized patients all showed clinical and laboratory evidence of kidney damage, liver damage or both kidney and liver involvement. None of these four was nearly as severe as the two patients mentioned above.

It is interesting to note that all of these patients were negro women and, as is to be expected, they were in the group handling the solvent. It must be brought out, however, that there were also white women doing this work and only one of these white employees reported to the hospital. That particular patient stayed only a few hours and her laboratory examinations were all negative. This apparent difference in susceptibility is brought out particularly in view of the recent studies on the importance of nutritional factors in the prevention of liver damage, as all of these patients are known to have lived on a low protein, high fat diet.

All of the hospitalized patients were treated with intravenous fluids to combat dehydration, sedation by needle or rectum as needed, feeding of a high protein, high carbohydrate, low fat diet by mouth or through an indwelling duodenal catheter, and the administration of the amino acid, Methionine, by mouth or by indwelling duodenal catheter in doses ranging from 6 to 12 gm. daily. All treated patients made an uneventful recovery except as noted above. There were no deaths in the treated group.

One other exposed worker, also a colored female, showed no remarkable early symptoms and continued to work for one week after exposure but then began losing time from the job. She died one week later following a pulmonary hemorrhage, and autopsy showed the cause of death to be acute diffuse pyelonephritis. Gram's stain revealed small and large colonies of negative bacilli that were considered to be of etiological significance. The liver sections showed diffuse central necrosis involving from one-third to one-half or more of the lobule. The remaining cells revealed marked degenerative changes. The liver findings are certainly what are expected following carbon tetrachloride exposure, but what the exposure had to do with the infectious process in the kidney is not apparent, and what it had to do with the terminal pulmonary hemorrhage that this patient suffered is also open to question.

Eight other patients had symptoms of nausea, headache and dizziness but required no hospital care and have shown no late evidence of liver or kidney damage.

Following this tragic experience an investigating board made several recommendations that seem worth bringing out at this time. In the first place the procedure of cleaning mines has been altered so that more mechanical cleaning and less solvent cleaning is done. Local exhaust ventilation is being installed where a solvent must be used. Any change in procedure must get approval of top management, and where changes in solvents are required advice from a solvent control group will be secured. A solvent control committee has been established consisting of representatives of the safety, chemical and medical departments whose function is to make rulings on the labeling, distribution and use of all solvents. A workable control system has been established throughout the plant for the issuance of solvents. All toxic solvents are kept under lock to be issued only on proper requisition and then only for the use according to specific rules posted in the solvents store room. It is interesting in this connection to note that a lacquer thinner, believed by its manufacturer to contain no dangerous solvent, was found to consist of 35% benzol. The manufacturer had used a thinner with a trade name and claimed that he was unaware of its contents. Nurses assigned to operating areas have been given

more instruction concerning symptoms of exposure to toxic materials handled in their operating areas, and a more rigid system of reporting accidents has been adopted.

A more detailed clinical description of the patients and a discussion of the value of Methionine in hepatitis appears in an earlier paper.[1]

Reference

1. EDDY, J. H.: Carbon Tetrachloride Poisoning: A Preliminary Report on the Use of Methionine in Hepatitis. *J.A.M.A.*, to be published.

Pathologic Changes in the Nervous System

—Due to Industrial Hazards—

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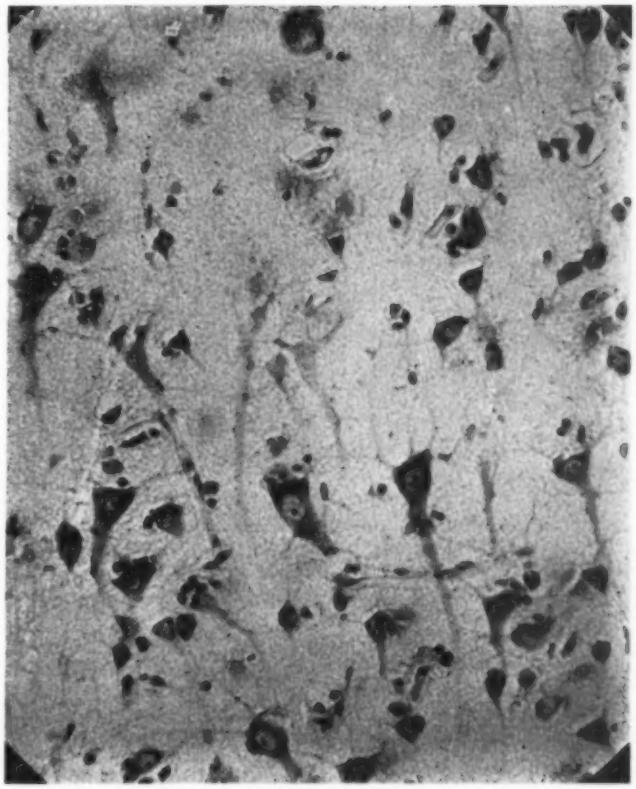
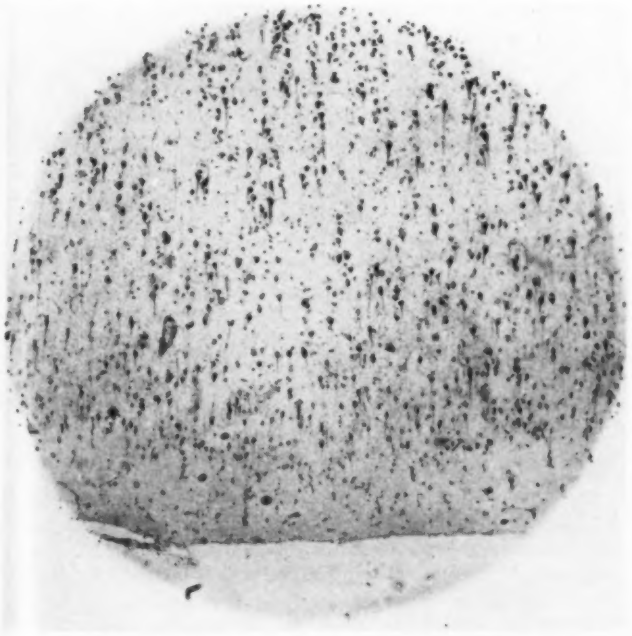
THE effect of chemical substances on the nervous system constitutes one of the most disputed subjects in medicine. In a large part this is due to lack of satisfactory clinical standards of intoxication. Clear cut, definite syndromes of neural damage are seen less and less often under modern industrial conditions, and too frequently indicate irreparable injury. The earliest and most frequent complaints referable to the nervous system are often subjective, and so closely parallel the manifestations of psychoneurosis that they may be disregarded or dismissed as psychogenic, especially when the factor of compensation is involved.

Much of the confusion concerning the reaction of nerve tissue to chemical agents stems from attempts to establish inflexible criteria of intoxication formulated on the assumption that the nature of the offending substance determines the clinical expression of neural involvement. Brain damage has been interpreted as the result of specific action of the intoxicating agent and the clinical manifestations, regardless of the intensity or duration of the poisoning as characteristic of that particular chemical.

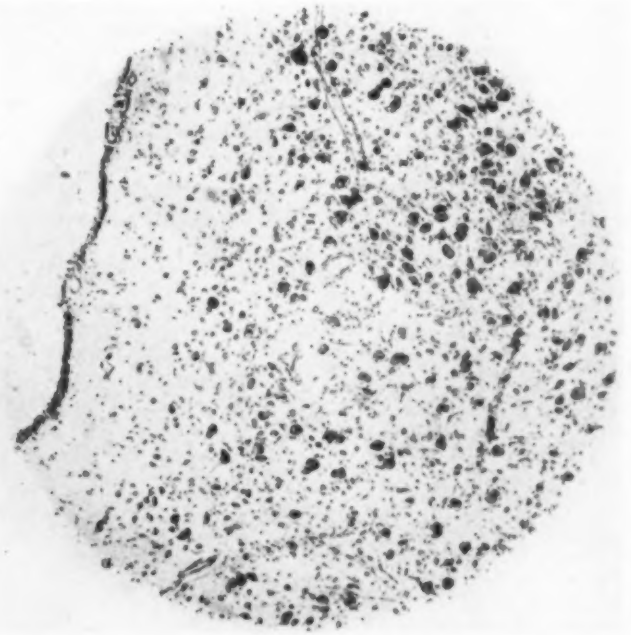
The validity of these generalizations, based, apparently, largely upon studies of isolated cases of chemical poisoning, due to accident, suicidal attempts or prolonged and uncontrolled exposure, is open to question. Parkinson's syndrome has been reported in manganese poisoning, as well as after intoxication by carbon monoxide, nitrous oxide and carbon disulfide; it is associated with progressive deterioration of the cardiovascular system in old age and occurs as a sequela of virus disease. Neither the clinical picture nor the morphologic alterations in the nervous system furnish a clue to the etiologic factor. Lipo-solvent



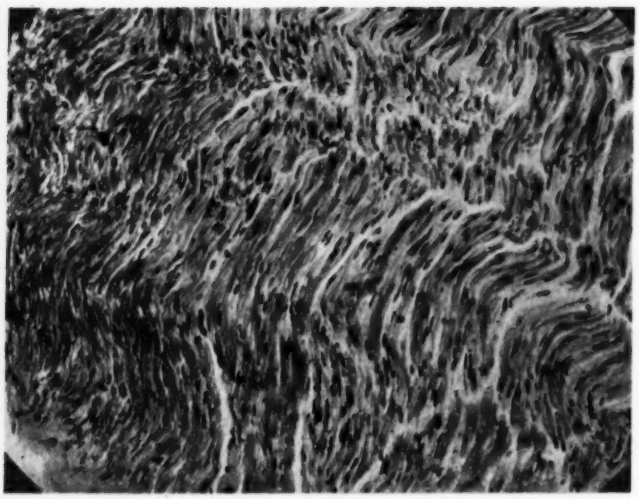
Cerebral cortex (x 253 toluidin blue stain). Selective damage to cortical cells from alterations in physiologic equilibrium due to lead. The actual concentration of lead in neural tissue in lead poisoning is less than in kidney or liver



Cerebral cortex (x 57 toluidin blue stain). Focal loss of cells in lamina 3 and 4 demonstrates the relative vulnerability of cortical neurones to a circulating toxin (ether)



Paraventricular nucleus-hypothalamus (x 69 toluidin blue stain). Focal destruction of cells in cerebral vegetative center in diabetic acidosis. Perivascular edema indicates alteration in environmental conditions. These changes are present in chemical poisoning as well as in metabolic intoxications



Peripheral Nerve (x 149 Weil myelin sheath stain). Patchy degeneration of myelin sheath with proliferation of interstitial elements in nutritional deficiency. The alterations are characteristic of peripheral "neuritis" regardless of the etiologic factor involved

action upon the myelin covering of the nerves has been predicated as the cause of peripheral nerve injury in carbon tetrachloride, carbon bisulfide and ethyl alcohol intoxication. Yet qualitatively identical changes occur in the neuritis of chronic diabetes, typhoid fever, vitamin deficiency and lead poisoning.

The similarity of reaction occasioned by such variety of noxious stimuli suggests that toxic substances in general influence the nervous system primarily through their effect upon physiologic equilibrium and that the resulting alterations in nerve cell metabolism, rather than the intoxicating agent, determine the extent of neural damage and its clinical expression. Integrity of function depends upon maintenance of physiologic balance between nerve tissue and its environment; disturbance of this relationship, whether effected by the action of chemicals, metabolic toxins or bacterial agents, results in neural dysfunction, the intensity of which depends upon the degree of alterations induced. The mechanism by which modification of neural environment is produced may be a specific attribute to the particular noxa involved, but the influence of such alterations upon the metabolism of the nervous system, rather than the nature of the toxic

Basal Ganglia (x 3 Weil myelin sheath stain). Bilateral necrosis of globus pallidus in carbon monoxide poisoning. This area of the brain is particularly vulnerable to circulatory disturbances. Similar lesions have been found following diabetic acidosis, lead poisoning and cardiac infarction

agent, or the manner in which it occasions its effect, conditions the response. The clinical expressions of neural dysfunction so established cannot be considered so much diagnostic of the intoxicating agent as indicative of the degree of environmental change and the relative vulnerability of individual components of the nervous system to such disturbances. Cells with the most complex organization, and, therefore, the highest metabolic requirements, would be most sensitive to modification of physiologic equilibrium, and areas with relatively inadequate vascular drainage more vulnerable than those where more rapid elimination of abnormal conditions occurs. Specifically, disturbances of cellular nutrition have been found to affect first and most severely, the cortical areas subserving higher psychic function and complex synthesis of ideas, the centers regulating autonomic function and the areas concerned with maintenance of equilibrium and coordination. In terms of clinical manifestations, the earliest evidence of intoxication, whether due to chemical agents or to disease, would be expressed by irritability, poor concentration, by instability of pulse rate, blood pressure and digestive functions, by tremor, dizziness or difficulty in performing skilled acts.

THE fundamental dependence of the nervous system upon environmental conditions for its integrity of function and the limitations in mode of reaction imposed by such non-specific mechanism can also be related to the factor of individual susceptibility to industrial hazards. In physiologic effect, disease states, nutritional deficiencies and metabolic disorders parallel the actions of chemical poisons. If certain of the liposolvent chemicals inhibit function by interfering with the oxidation of glucose by the nerve cell, thiamin lack, whether due to dietary deficiency or liver disease, accomplishes the same end result through its effect upon carbohydrate metabolism in general. Impaired oxidation in nerve tissue may result from increased utilization of oxygen in thyroid disease or infection, as well as from the interference with oxygen supply accompanying detoxification of hydrogen sulfide. Thus, the effects of industrial exposure, too slight to cause neural damage, may be intensified by physiologic alterations incident to disease or nutritional deficiencies to the degree that signs of intoxication result. Even after elimination of the hazard, physiologic alterations due to depression of the hematopoietic system, liver damage, or cardiovascular injury initiated during the period of intoxication may perpetuate the signs of neural dysfunction.

Bibliography

1. BEHREND, A., and RIGGS, H. E.: Cerebral Complications Following Surgical Operation. *Arch. Surg.*, 40: 24-40, January, 1940.
2. Carbon Disulphide and Hydrogen Sulphide Hazards in Viscose Rayon Industry. Bull. 46, Dept. Labor and Indust. Commonwealth of Penna., August, 1938.
3. CHORNYAK, J.: The Structural Changes Produced in the Human Brain by Oxygen Deprivation (Anoxemia) and their Pathogenesis. Edward Bro. Inc., Ann Arbor, Michigan, 1938.
4. DILLON, E., RIGGS, H. E., DYER, W. W.: Cerebral Lesions in Uncomplicated Fatal Diabetic Acidosis. *Am. J. Med. Sci.*, 192: 360-366, September, 1936.
5. EHRICH, W. E., BELLET S., and LEWY, F. H.: Cardiac Changes from Carbon Monoxide Poisoning. *Am. J. Med. Sci.*, 208: 511-533, October, 1944.
6. FOULGER, J. H., and FLEMING, A. J.: Industrial Exposure to Toxic Chemicals. *J.A.M.A.*, 117: 831-836, September 6, 1941.
7. GOODMAN, L., and GILMAN, A.: The Pharmacological Basis of Therapeutics. Macmillan Co., New York, 1941.
8. Lead Poisoning: A Symposium. *J. Indust. Hyg. & Tox.*, 25: 35-79, February, 1943.
9. HENDERSON, Y., and HAGGARD, H. H.: Noxious Gases. Chemical Catalogue Co., New York, 1927.
10. LEWY, F. H.: Vitamin B. Deficiency and Nervous Diseases. *J. Nerv. & Ment. Dis.*, 89: 1-25, 174-203, January, 1939.
11. LEWY, F. H., and DRABKIN, D. L.: Experimental Carbon Monoxide Poisoning. *Am. J. Med. Sci.*, 208: 502-511, October, 1944.
12. RIGGS, H. E., LETONOFF, T. V., and REINHOLD, J. G.: Tissue Lead

Concentration in Disease. *Am. J. Clin. Path.*, 14: 175-186, March, 1944.
13. SMITH, F. L., RATHMELL, T. K., and MARCIL, G. E.: Lead and Lead Poisoning Tests. Cyclopedia of Medicine, Surgery and Specialties, pp. 811-837. F. A. Davis Co., Philadelphia, 1939.
14. SMITH, F. L., RATHMELL, T. K., and MARCIL, G. E.: Early Diagnosis of Acute and Latent Plumbism. *Am. J. Clin. Path.*, 8: 471-514, September, 1938.
15. YANT, W. P., CHORNYAK, J., SCHRENK, H. H., PATTY, F. A., and SAYERS R. R.: Studies in Asphyxia. Public Health Bull. 211, U. S. Treasury Dept., August, 1934.

ACTIVITIES of STATE HEALTH DEPARTMENTS

Colorado

INVESTIGATION of cutting oil dermatitis in machine shops, dermatitis in a plant manufacturing plastics, and dermatitis in plants using antimildew preparations for Army material were made in Colorado recently by DR. LOUIS SCHWARTZ and DR. PAUL C. CAMPBELL, JR., of the Dermatoses Section, Industrial Hygiene Division, U. S. Public Health Service, reports AUGUST T. ROSSANO, JR., Director of the Division of Industrial Hygiene, Colorado Board of Health. In the plastics plant, patch tests of a new plastic—allyl alcohol resin—revealed a severe primary skin irritant. It is expected that this testing will forestall a serious outbreak of dermatitis when production of the new product is begun.

—*Industrial Hygiene News Letter*, February, 1945.

Los Angeles

DIRECT contact with labor unions whose members had complained about conditions pertaining to shipyard welding has been made by the Division of Industrial Hygiene of the Los Angeles City Health Department, reports DR. D. G. MACPHERSON, Director. This has proved to be a highly effective method of getting at the source of complaints, leading to studies aimed at specific points of danger or irritation, he declares. Particularly in some of the smaller shipyards where health protective measures are still relatively undeveloped and management is sometimes none too cooperative, this method has been found by the division to be an excellent guide to action. In addition, it has served as a successful method of industrial health education.

—*Industrial Hygiene News Letter*, January, 1945.

New Jersey

MANY requests for information have been received from plants engaged in the mildewproofing of various types of materials. Most of the requests were in regard to the toxicity of chlorinated phenols, which are being used quite extensively for the tropicalization of signal corps equipment. The Bureau of Industrial Health is preparing a leaflet which will present abstracts from the literature on the toxicology of chlorinated phenols and methods of safe handling. The leaflet will be distributed to all plants using these compounds. . . . ON February 7, MR. E. L. SCHALL, of the Bureau of Industrial Health presented a paper on the subject, "Safe Handling of Toxic Materials," at the monthly meeting of the South Jersey Industrial Safety Council. Following the paper, members of the staff of the Bureau presented a panel discussion, answering questions of those attending the meeting. A summary of this program will be published in the State Health Department's *Public Health News*. . . . A NEW type of project will be initiated by the Bureau of Industrial Health in March. A preliminary industrial hygiene survey of a group of industries will be conducted with the Garwood Board of Health. This borough, though very small in size, is heavily industrialized. Following the survey a plan will be arranged for making return visits to the plants in the borough when needed. The project will be publicized and it is hoped that other municipalities in the state will be stimulated to carry on this type of project with the Bureau. . . . TWO plants in the state have been experiencing dermatitis among their carpenters handling cement coated nails. The coatings are applied by nail manufacturers in liquid form, usually consisting of natural and synthetic resins and asphalt in a petroleum naphtha vehicle. They dry rapidly leaving the resins and asphalt on the nail, forming a coating that acts as an abrasive surface which holds the nail tightly in the wood after it is driven in. Patch tests were performed with scrapings of the nail coatings by DR. L. A. KAGEN on employees having dermatoses. Three-quarters of these workers gave positive reactions to the material. Among the control measures suggested were the following: use of small wooden boxes for holding nails for immediate use rather than the heavily contaminated pockets of aprons; cotton gloves for minimizing contact with the nail coatings; protective ointments of the water soluble type if some workers find it not feasible to use gloves; good personal cleanliness; daily removal of material deposited on tools and work benches.

Missouri

CRAYON of a type widely used in marking steel, aluminum, and other metals was found to be the cause of a serious outbreak of dermatitis among foundry workers, in a recent investigation made by the Industrial Hygiene Service of the Missouri State Board of Health. The marking pencil was used in applying identification numbers on poured castings with a surface temperature of 800-900°F. When used on cold metal parts, the crayon caused no trouble, but in contact with the hot metal chlorinated naphthalene used as pigment binder was volatilized, causing dermatitis of the arms, face, and neck in workers using it. Air samples collected in the vicinity of the marking operations showed the presence of high concentrations of chlorinated naphthalene. Shutdown of this vital operation was avoided through prompt development of a new crayon containing no toxic material.

—*Industrial Hygiene News Letter*, February, 1945.

South Carolina

ACCORDING to the *Industrial Hygiene News Letter* of the U. S. Public Health Service, a mass movement toward physical examination of employees in the textile mills of South Carolina has resulted from efforts made by the Division of Industrial Health of the State Board of Health to educate manufacturers in the advantage of an active health program. Leading mills, with personnel services including good health programs, were having so much less trouble securing and keeping capable workers that less progressive mills became convinced of the advantages of placement based upon pre-employment examinations.

—*Am. J. Pub. Health*, March, 1945.

Washington

THE Industrial and Adult Hygiene Section directed its services toward the development of a program and activities designed to protect and promote healthful working environment. It is estimated that approximately 255,351 employees were affected by the industrial hygiene problems investigated by the Section during 1944. As a result of these investigations recommendations were made affecting approximately 178,458 industrial workers. Of this number approximately 99,895 employees were affected through the compliance with the recommendations. An increasingly close correlation of activities of the State Department of Labor and Industries and the State Department of Health in matters pertaining to industrial hygiene has been effected throughout the year. Copies of all occupational disease claims are made available to this section. A careful medical analysis by this Section of 2,630 of these occupational disease reports indicated the need for early industrial hygiene investigations in a large number of instances to determine their validity. Detailed joint planning by these two departments has resulted in the formulation of a program for early reporting of occupational diseases to this section and for its investigation of further cases of occupational disease and will make possible prevention of further cases of occupational disease and will also provide the Department of Labor and Industries with valuable information to assist them in determining their validity for compensation. A joint program was carried on, assisting the Navy and Maritime Commission in reducing health hazards in the shipbuilding industry. The section gave considerable aid to the U. S. Public Health Service and Maritime Commission in their nationwide study of welding hazards.

—*Northwest Medicine*, March, 1945.

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"Let's Look at the Record"

THE U. S. Secretary of Labor sponsors a yearly conference on labor legislation. The delegates, appointed by the state governors, are usually their labor and industrial commissioners. The invited guests are principally representatives of labor organizations, at state levels. At last year's assembly—the 11th Conference on Labor Legislation, held in Washington in December, 1944—there were various committee reports, among them that of the Committee on Compensation, Safety, Health and Welfare. This report, *inter alia*, made a vicious attack on the U. S. Public Health Service and the various State Health Departments regarding their work in the field of industrial hygiene. According to the committee, which is composed of lay people, the U. S. Public Health Service and the various state and local industrial hygiene units are engaged in a field in which they have no legal authority, and their activities are alleged to have added to confusion, duplication of effort, and waste of Federal funds. The Public Health Service is accused of blocking Federal legislation, namely, H.R. 2800* introduced last year by Mrs. Norton, of New Jersey, which would place industrial hygiene activities in the Labor Department; and the various industrial hygiene services are charged with non-cooperation with labor, especially in rendering services on industrial health matters.

Such charges, no matter who makes them, are too silly for serious attention. In ordinary times they would "die of their own too much." But the times are out of joint, the "smear technique" is abroad in the land, and, sad to say, the lie that is "big enough and repeated often enough" is being strenuously propagandized for the possible effects it can be made to have on public opinion—and votes. As part of that technique, these charges, therefore, should be shown up for the malicious and mendacious "smears" that they are. They can be shown up without being answered, for they are too preposterous to be dignified with either answer or argument. We help them to be shown up—indeed, they are exploded clear back into the nebulous and self-serving imaginings from whence they came—by the calm, dispassionate, statistical and factual report on "Official Industrial Hygiene Services" for the two years ending with June, 1944, prepared by VICTORIA M. TRASKO, and published in this issue. At the date of this report there were 47 industrial hygiene units throughout the country, in 38 states. They have had to function during these war years with greatly depleted staffs and to cope with the manifold problems associated with increased production for war; and yet, in spite of all these difficulties, they have been able to pile up the remarkable record disclosed in MISS TRASKO'S analysis.

This record was not prepared because of any attempts to put the Health Departments on the defensive. In the first place, putting them on the defensive is something that can't be done; and in the second place, MISS TRASKO'S summary is only the usual periodic accounting, made in the routine course of business. Her report is, however, a report of stewardship, and, from every objective consideration, something of which the stewards have the right to be proud. The facts it sets forth, and the simple dignity of the manner in which they are presented, should effectually silence the pop-gun sniping of the servants of smear.

IT IS unfortunate that this vicious attack cannot be completely disposed of by showing up the preposterous and silly nature of the charges. There still exists the need to consider who made the charges, and why. Obviously enough, they were inspired from the Department of Labor, and, ridiculous as they are, they constitute the very same charges that have real meaning when urged against the passage of H.R. 2800, which was (and, as H.R. 525, still is) a Labor Department bill. "Confusion," for example, exists nowhere but in Washington; "duplication of effort" remains to be brought about by the proposed enactment in thousands of instances where it hasn't as yet even been thought of; and "waste of Federal funds" is utter nonsense in the face of the remarkable record of the Health Departments accomplished at a total expenditure of "slightly over two and one-half million dollars" for two years, where the Labor Department is asking for five million per year. As to the allegation of "non-cooperation with labor," the record gives that the lie, and the current situation supports and amplifies the record. For example, there are several items in these pages which tell of the highly satisfactory cooperation given and received as a matter of course throughout the states; these, from month to month, are indicative of a harmony that is completely taken for granted, and matter of course, in the daily contacts of those who are concerned with industrial health matters and are doing the day-to-day work in the field. But "let's look at the record!": "Forty-three percent of the requests for service came from management, 31% from state labor authorities, and 9% from labor unions, employees and complainants. Other state and local health agencies accounted for 10%, and Federal war agencies for 4% of the requests. The remaining 3% originated from insurance companies, private physicians, contractors and unofficial agencies." It must be concluded that the alleged "non-cooperation with labor"

*H.R. 2800 was later superseded by H.R. 4371, and is before the present Congress, introduced on January 3, 1945, as H.R. 525.

Based on findings of extensive x-ray chest surveys in the past three years, it is estimated that at least half a million cases of active tuberculosis are hiding in *apparently healthy* population groups.

How many unsuspected TUBERCULAR CASES among your employees?

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exists nowhere but behind a desk in Washington, as a hope—or even, perhaps, an intention to be somehow maneuvered into a semblance of fact when the Labor Department gets the five million. Interesting, too, on the matter of "legal authority" is the truth that, although every State Department of Health under its organic act has the authority to investigate and control health hazards in industry, so many of them in so many states have sought and obtained specific authority for this work. The most recent additions to the states in this category are Tennessee and Wyoming. Could they be fearful of the Labor Department?

DR. PILGRIM

TAKING up where last these items were at pause, to mid-Missouri for an inspection and conferences anent a technical survey on the control of certain dust hazards, together with matters of both hygiene and medicine, with management abundantly cooperative. . . . A TALK on industrial health before a management-methods seminar, where interest great, the questions and discussions outdistancing the time. . . . AN Industrial Commission matter, the same being an alleged case of silicosis wherein neither the x-rays taken before, nor during, nor after the employment revealed any sign of the disease, and wherein it was shown me again how adroitly the facts can be ignored in favor of the so-called "exigencies" of opportunism. . . . A TELEGRAM from the War Department to say the son missing in action in Belgium, with the sympathy of many friends who hoped, with me, for future news that he was a prisoner of war. . . . ATTENDING, and addressing, the Purdue Industrial Vision Institute, at Lafayette, where was much and contined interest in matters of industrial health, with emphasis on good vision in the circumstances of work. . . . ANOTHER Industrial Commission hearing, this time in Indiana, where again the fatal variance between the facts and the allegations, with no basis whatsoever for relationship between the disease as claimed and the occupational environment as proved. . . . ENGAGED with a committee to investigate certain characteristics of seeming difficulties in the induction of a fellow practitioner in this area, visiting the office of Selective Service and being assured that due consideration would be given the problem, as later it was. . . . THEN to Buffalo, where was great interest in the working out of a problem of industrial and public relations, with reference to occupational conditions in a small community and in a small plant. . . . AND to Pittsburgh, where another hearing, and again the allegation by a well-intentioned private practitioner that an employee sustained an occupational disease in an environment and under working conditions and using compounds about which the practitioner knew nothing; this being another sample of utter disregard for etiology—the diagnosis being certain in the mind of the general practitioner without it. . . . THEN with the Board of Directors of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS on many important matters concerning policy, and later at a complimentary dinner given to the Board of Directors and others by the Council on Industrial Health of the American Medical Association, where was much good feeling and exchanging of experience. . . . REVIEWING the industrial hygiene medical literature at the monthly dinner meeting of the Chicago Section of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, with the bringing up of many new subjects and phases of this work. . . . AT CINCINNATI, speaking at a combined meeting of the Society for the Advancement of Management and the Cincinnati Academy of Medicine on the subject "The Labor Relations Value of Industrial Health Programs," about which there was much discussion and great interest shown by both management and physicians, that of the former being most marked. . . . AND speaking again on the same subject to the Southern Cook County Industrial Club, in the Pullman District, where likewise there was great interest voiced. . . . TO DENVER, for an investigation in a pottery plant in which management is concerned about the dust exposures, to know exactly what they are; also reading x-ray films of the chests of some of the employees; visiting with FRED INGRAM, and DRS. SCHREIDER and BAMBERGER, going over the well-equipped industrial hygiene laboratory, originally started by DON CUMMINGS, in connection with the University of Colorado Medical School and Hospitals; making individual talks to employees at the before-mentioned pottery concerning the chest x-ray findings, and, later on, talking to the foreman as a group concerning dust problems and their control. . . . THENCE home to shocking news—a second telegram from the War Department telling of the supreme sacrifice the son has made. With the sympathy of many friends and acquaintances pouring in each day, one cannot help but go back to the beautiful words of Howard Vincent O'Brien, written about a year ago, when he lost his own son—words which have such great sustaining value: "There is a line of Walt Whitman's—something about life being a matter of surmounting one hill, only to find another in the way. I have found this true. But I have found also that with each hill climbed there is a new vista, a broader horizon. One who gets that red-starred telegram: 'The Secretary of War desires to express his deep regret. . . .' is plunged into the valley of the shadow. You can brace yourself for that message. You can, in a way, be ready. But it rocks you. It takes you off your feet, no matter how firmly they have been planted against it. But there is work to be done. The show has to go on. You have to laugh—and be laughed at. The boy who joined the clouds would scorn you if you altered your course or turned your back. He didn't. So you carry on. You start climbing the next hill. And then you find something you weren't prepared for. Your pain eases. You see a strange brightness in the sky. Warmth creeps through your chilled heart. It is not the numbness of resignation. It is an active sense of well-being. Suddenly you realize what has happened. It is the letters. They come from close friends and from old but distant ones, from those you have thought indifferent or hostile; from strangers and from people who signed no names; from the great and from the humble. . . . You pay high for what you learn from that War Department telegram. The new light hurts your eyes. But the letters that come afterward—they are worth their cost. Telegrams are coming to German homes, too—and letters afterward. German boys are melting into mist and those who loved them search the flaming skies for answer to the riddle. Is there an answer? Well, there is faith and hope and perhaps, in centuries yet unborn, more charity. And there is that flood of gentle sympathy, sign and portent man is climbing slowly toward the stars. In the hot fire of sorrow shared, the dross of despair is burned away. More boys will grow in strength and beauty, only to wink out like sparks in the night. More bubbles will form and glow and vanish whence they came. Their memorial is the deep-buried spring of goodness uncovered by their passing". . . . NOW an eastern trip, lecturing at Brown University, in a series on industrial medicine and hygiene, on the subject "Coordinating Industrial Medicine and Hygiene in Modern Industrial Medical Practice"; later at dinner at the Hope Club with some of the Board of Directors of the University and DRS. MCDONALD, FARRELL and DEERY. . . . IN NEW YORK CITY, consulting with an eastern industrial group concerning the public relations policy as to an important problem involving difficulties arising apparently from occupational environment. . . . AT BALTIMORE, attending the very interesting evening meeting of the General Motors Club, at which the medical profession were the guests of the organization, and again having pleasant converse with DRS. SELBY, LANZA, FULTON, JOHNSON, WAMPLER, WILLIAMS, BOETTGER, and JOHN MCMAHON. . . . THEN back to Chicago in time to address the dinner meeting of the Chicago Section of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION on "Looking Ahead in Occupational Disease Developments," and to resume in the laboratory. And so, to carry on. . . .

No. 5 of a series on how vitamins work in industry

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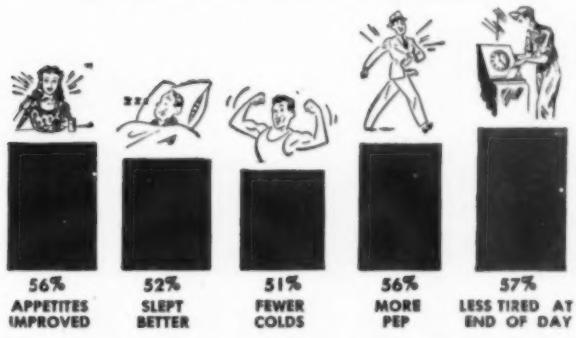

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Monomeric Methyl Methacrylate

—Studies on Toxicity—

C. R. SPEALMAN, R. J. MAIN, H. B. HAAG, and P. S. LARSON,
Department of Physiology and Pharmacology, Medical College of Virginia, Richmond

ALTHOUGH monomeric methyl methacrylate is rather widely employed in the manufacture of various plastic articles, with the exception of the report by Deichmann,[1] little other information is available as to its toxicity and general pharmacologic effects. Because of this lack of information and because of the importance of the material, the present studies concerned primarily with the toxicity of methyl methacrylate were undertaken.

Experimental

TOXICITY. The toxicity of monomeric methyl methacrylate* was determined on adult albino mice, rats, guinea pigs, rabbits, and dogs, all of mixed sexes, by various routes of administration. The rats, mice, and dogs were maintained on Purina Dog Chow and the guinea pigs and rabbits on Purina Rabbit Chow, plus greens as needed.

Table 1 gives in resume the results of the acute toxicity experiments in which the methyl methacrylate was administered, either subcutaneously, intraperitoneally, or orally. It was not the intent of these observations to establish with fine precision the toxicity of methyl methacrylate, hence only six animals were used at each of four dose levels for each method of administration. In the case of dogs, two animals were used at each dose level. Our figure of 10 cc. per kg. as the approximate $L.D._{50}$ of methyl methacrylate for rats on oral administration is in reasonable agreement with the value of 8.40 cc. established by Deichmann[1] on a larger series of animals.

Because death usually ensued so rapidly in the fatalities encountered in these acute experiments, no postmortem observations were made except on one dog in which death was delayed for several hours following oral administration of the methyl methacrylate. On examination of the heart, lungs, spleen, liver, adrenals, kidney and gastro-intestinal tract of this animal, the only histologic changes observed were degenerative ones in the tubules of the kidney.

In order to study the toxicity of methyl methacrylate by skin absorption, rabbits were used, the compound being applied to the back after close clipping of the hair. To two animals, 20 cc. per kg. was applied; to two others, 40 cc. per kg. These larger amounts were sufficient practically to cover the entire skin of the animal. All four rabbits survived, although signs of irritation were noted momentarily, and with the higher dose some signs of temporary central nervous system depression resulted. Deichmann's observations[1] are practically identical with these.

For studies concerned with the toxicity of methyl methacrylate by inhalation, mice, guinea pigs, and dogs were used. The animals were placed in a glass chamber measuring 56 x 61 x 91 cm. Air containing various concentrations of methyl methacrylate was passed into this chamber at the rate of 500 liters per hour. This rate of supply insured adequate atmospheric conditions for the animals with respect to O_2 and CO_2. The required concentration of methyl methacrylate was introduced by passing the necessary frac-

* Present address: LT. C. R. SPEALMAN, National Naval Medical Center, Bethesda, Maryland.
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TABLE 1.
ACUTE TOXICITY OF MONOMERIC METHYL METHACRYLATE

Animal	Method of Administration (Doses given as cc./Kg.)								
	Orally[1]			Subcutaneously			Intraperitoneally		
	Est. L.D.$_{50}$ (cc./Kg.)	Range[2]		Est. L.D.$_{50}$ (cc./Kg.)	Range		Est. L.D.$_{50}$ (cc./Kg.)	Range	
		Dose cc./Kg.	Fatalities		Dose cc./Kg.	Fatalities		Dose cc./Kg.	Fatalities
Mouse	——	—	—	6.3	5.0	0/6	1.0	0.5	0/6
					7.5	6/6		2.5	6/6
Rat	10.0	2.5	0/6	7.5	5.0	0/6	1.8	1.0	0/6
		15.0	5/6		10.0	6/6		2.5	5/6
Guinea pig	6.3	1.0	0/6	6.3	2.5	0/6	2.0	0.5	0/6
		7.5	6/6		7.5	5/6		2.5	4/6
Dog	5.0	2.5	0/2	4.5	4.0	0/2	——	—	—
		5.0	1/2		5.0	2/2			

[1] Stomach tube or capsules. [2] *Largest dose resulting in no fatalities.* Smallest dose resulting in all or nearly all fatalities.

tions of the supply through a nebulizer similar to the one described by Main[2] but of larger capacity (75 cc.) the remaining fraction of the air supply was shunted around the nebulizer. The two fractions were reunited just before entrance into the animal chamber. The air passed out of the chamber through a small hole in its bottom.

Deichmann[1] determined the concentration of methyl methacrylate in his inhalation experiments by chemical analysis of the atmosphere and also by computations based on total air volume and amount of methyl methacrylate vaporized. These two procedures checked within ± 3%. We computed our concentration solely on the basis of total air volume and amount of material

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vaporized. During the opening of the chamber incident to placing the animals therein, dilution of the accumulated methyl methacrylate vapors within the chamber occurred. Primarily because of this the theoretical vapor concentration values arrived at in our calculations were undoubtedly higher than what they actually were inside the chamber, at least in the early part of each experiment. Only one dog, six guinea pigs, or 15 to 20 mice were placed in the chamber in any one experiment.

Table 2 gives the results of these observations on the effects of methyl methacrylate vapors. Deichmann[1] found that guinea pigs were killed by concentrations of from 19 mg. to 24 mg. per liter of methyl methacrylate in five hours, but survived concentrations of 17.5 mg. per liter and under for eight hours. In our experiments six guinea pigs were subjected to 39 mg. per liter three hours daily for 15 days, without untoward effects, except possibly some pulmonary irritation. This and other experiments in this series would seem to indicate that the effects of methyl methacrylate were not very cumulative.

PATHOLOGIC OBSERVATIONS.* The heart, lungs, spleen, liver, adrenals, kidneys, and gastro-intestinal tract of the animals were fixed in formalin imbedded in paraffin, sectioned, stained with hematoxylin and eosin and with Masson stain, and examined. These specimens were taken chiefly from the animals used in the chronic inhalation experiments.

Of the organs examined, the heart, adrenals, spleen and gastro-intestinal tract showed no discernible histologic changes in any of the animals. The lungs showed varying amounts of hemorrhage and atelectasis, depending on the method of sacrifice, and in a few instances chronic healing inflammatory changes. In one animal (a guinea pig inhaling 0.039 mg./L) a definite pneumonia with small lung abscesses was found. The changes found in the lungs may have been due in part to the irritant action of methyl methacrylate. Apparently these changes were reversible, since healing was found in some instances.

Pathologic changes were found in the livers and kidneys of the animals in certain experiments. Most definite were those indicative of liver degeneration. In this condition the liver cells were often swollen; the nuclei were altered in size and shape and there were certain characteristic changes in the cytoplasm. These changes were of a character usually found after sufficient exposure to certain chemical substances, e.g. $CC1_4$. Hepatitis and focal necrosis were also found, but inasmuch as such changes in the liver have been observed in animals not subjected to any experimental procedure, their presence in animals exposed to methyl methacrylate is of questionable significance. Degenerative changes were found in the tubular cells of the kidney in the case of dogs. The degree of severity varied in different animals. Such changes may be caused by a toxic substance, and it is likely that the methyl methacrylate was the causative agent in certain instances; however, mild degrees of this type of changes are at times found in apparently healthy, untreated laboratory animals.

COMPARATIVE ACUTE TOXICITIES OF METHYL METHACRYLATE, ACETONE AND ETHYL ACETATE VAPORS. In order to make an approximate comparison of the acute toxicity of the vapors of monomeric methyl methacrylate with those of more familiar substances, additional numbers of mice were exposed to the vapors of methyl methacrylate, acetone (USP 11) and ethyl acetate

*The histologic examinations were done by DR. G. Z. WILLIAMS, Associate Professor of Pathology in this institution, to whom we are indebted for making these observations.

TABLE 2.
TOXICITY OF MONOMERIC METHYL METHACRYLATE BY INHALATION

Exp. No.	Animals	No. of animals used	Concentration mg./L	Duration of exposure (hr.)	Results	No. of necropsies	Pathologic findings[1]
a. *Acute experiments*							
1	Mice	15	47.7	5	9 died (2-5 hr.)	7	Liver degeneration, hepatitis and focal necrosis[2]
2	Mice	15	61.8	3	All died (1-3 hr.)	3	Liver degeneration, hepatitis and focal necrosis[2]
3	Guinea pigs	6	72.1	4¼	All died (2¾-4¼ hr.)	3	Liver degeneration
4	Dogs	2	41.2	3	Both died (2-3 hr.)	2	Liver degeneration & tubular degeneration in kidney
5	Dogs	2	72.1	1½	Both died (1-1½ hr.)	1	Liver degeneration & tubular degeneration in kidney
b. *Chronic experiments*				*hrs.* (daily) / *days*			
6	Mice	20	41.2	½ / 15	1 died (5th day)	8	Nothing significant[3]
7	Mice	20	41.2	1½ / 15	2 died (2nd-3rd days)	8	Nothing significant[3]
8	Guinea pigs	6	39.3	3 / 15	All lived	5	Nothing significant[3] (see text)
9	Guinea pigs	6	65.5	3 / 3	All died (1-3 days)	6	Liver degeneration
10	Dogs	2	41.2	½ / 15	Both lived	1	Nothing significant
10a	Dogs	2	46.8	½ / 15	1 died (14th day)	1	Liver degeneration & tubular degeneration in kidney
11	Dogs	2	46.8	1½ / 8	Both died (6-8 days)	2	Liver degeneration & tubular degeneration in kidney

[1] Animals living at the end of the experiment on which postmortem observations were desired were killed either by decapitation or electrocution. In some, sections were taken when the animal was under Dial anesthesia.
[2] Representative animals among those that survived exposure as well as among those that died were examined postmortem.
[3] The animals that died were not examined, since they were partly eaten by the survivors; it was felt that their death was not associated with the experimental procedures.

(CP). The data on these tests are listed in Table 3, and indicate that for mice methyl methacrylate vapor is more acutely toxic than acetone and less toxic than ethyl acetate.

BEHAVIOR OF ANIMALS AND MANNER OF DEATH. The most constant manifestation in the animals of the inhalation experiments when exposed to a sufficiently high concentration of methyl methacrylate, was depression. This was usually preceded by ataxia. Excessive salivation was often present, especially in dogs. Dogs also vomited during some of the experiments. Escaping movements and other evidences of irritation occurred chiefly in dogs. When methyl methacrylate was given orally or by injection, depression again was the most noticeable symptom. The dogs in these latter experiments did not vomit. In the skin absorption experiments, some irritation and ataxia were present temporarily; with the higher doses, the animals squealed and ran about, but this effect soon subsided and depression followed.

Death was usually the terminal event of a depressed state. It often occurred during exposure in the inhalation chamber, or a few minutes to a few hours after administration of the chemical in the other experiments. One dog died in the night following exposure to the vapor. The other animals seldom died if they survived for more than 12 hours following an inhalation

TABLE 3.
COMPARATIVE TOXICITY OF ACETONE, ETHYL ACETATE, AND MONOMERIC METHYL METHACRYLATE FOR MICE EXPOSED TO THESE VAPORS FOR 3 HOURS

Substance	Estimated $L.D._{50}$ (mg./L.)	Concentration cc./L.	Concentration mg./L.	Results
1. Acetone	90 mg./L.	0.074	58.5	2 out of 20 died in 3 hr.
		0.089	70.3	2 out of 20 died in 3 hr.
		0.140	110.6	All (20) died in 3 hr.
2. Ethyl acetate	44 mg./L.	0.032	28.8	1 out of 20 died in 3 hr.
		0.049	44.1	10 out of 20 died in 3 hr.
		0.052	46.8	14 out of 20 died in 3 hr.
		0.115	103.5	All (20) died in 1½ hr.
		0.160	144.0	All (20) died in 1 hr.
3. Methyl methacrylate	55.0 mg./L.	0.028	26.2	1 out of 20 died in 3 hr.
		0.051*	47.7	2 out of 15 died in 3 hr.
				9 out of 15 died in 5 hr.
		0.066*	61.8	All (15) died in 3 hr.
		0.103	96.4	All (20) died in 2¼ hr.

*Data previously established for toxicity of methyl methacrylate on mice by inhalation (Table 2).

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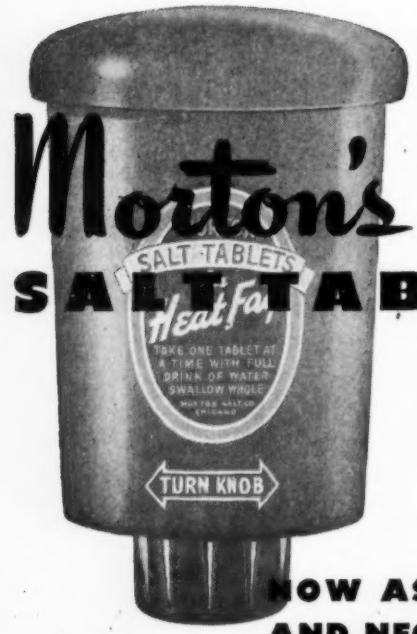

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experiment. Following other methods of administration, the animals usually died within eight hours. Very rarely a death occurred after 24 hours or even as long as 72 hours. In a few cases especially studied for the purpose (mice, acute experiments), the heart was seen to beat following stoppage of respiration. This suggests that paralysis of the respiratory apparatus is responsible for death, an observation in keeping with that of Diechmann.[1]

Local Actions

IT HAS been previously remarked that when methyl methacrylate was put on the skin of rabbits there resulted some evidence of irritation. It was also observed in inhalation studies that there was some temporary conjunctival irritation in animals exposed to the vapors. To further investigate this local irritating effect three drops of monomeric methyl methacrylate were instilled into the left eye of six rabbits, the right eye being observed as the control. The rabbits immediately closed their left eyes and attempts to remove the irritant were made with the paws. The eyes remained closed for the greater part of the time up to four or five hours after the beginning of the experiment. Inflammation and edema of the left eyes were present; the right eyes were unaffected. After 24 hours, the left eye of two of the rabbits appeared nearly normal; in four of the rabbits there was edema of the lids and inflammation of the conjunctiva. Later there was a rather large amount of turbid exudate draining from the eye; after 72 hours the left eye of all rabbits had returned to normal.

In order to obtain information as to the local irritating effects on the skin of man as well as the possible sensitizing effect of methyl methacrylate the following experiments were done.

Fifty medical students (49 males and one female) were initially tested as follows: Pellets of cotton were saturated with one of two different batches of methyl methacrylate, applied to one forearm, and covered with "Elasto" patches. Forty-eight hours later these patches were removed and examination made of the involved areas. Fifteen showed a reaction from Batch "A" and six from Batch "B." Four individuals reacted to both batches. These reactions were mild in character consisting chiefly of an area of mild erythema limited to the site of application of the pellet.

Ten days later these same subjects were retested for sensitization in a similar fashion using the opposite arm, and in place of the cotton pellets one-fourth inch squares of linen cloth were used. In addition, control observations were made using either cotton pellets or linen squares saturated with saline. At the time of removal of the patches in this second test no sign of reaction was present in any of the subjects. At intervals varying from a few hours to four days later, skin reactions characterized by erythematous, itching areas occurred in 10 individuals and persisted for periods up to a week and longer. The sites involved in most cases included both sites of methyl methacrylate application in the second test, and in one instance only that from Batch "B." Either simultaneously or slightly before or slightly after the skin covered by the second patch test reacted, there were reactions in the two areas involved in the first test in eight of the 10 individuals and in only the one area covered by Batch "A" in one individual. Of the 10 who reacted in the second test, nine had given reactions in the initial test.

In this same connection several series of observations have been made with polymeric methyl methacrylate in the form of "Plexiglas" and the pigmented denture materials "Vernonite" and "Crystolex."

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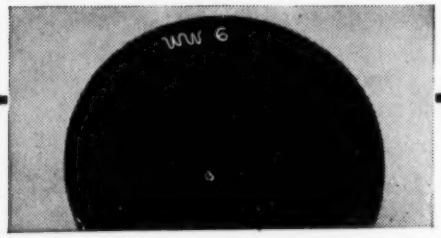

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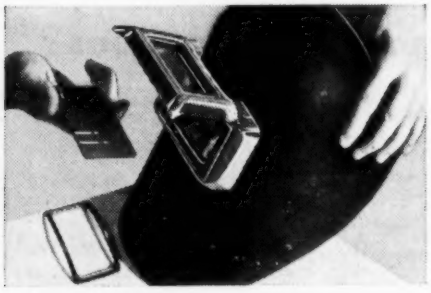

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The experiments on Plexiglas were done on men. Plexiglas was used in the form of discs measuring 12.6 mm. in diameter and 1.14 mm. in thickness. Fifty medical students (three females and 47 males) served as subjects. The Plexiglas was applied to the forearms and covered with "Elasto" patches. Forty-eight hours later these patches were removed and examination made of the area involved. No reactions whatsoever were observed in any of these 50 subjects.

Two weeks later these same subjects were retested in a similar fashion using the opposite arm, and at the same time a control disc made of aluminum was likewise applied. No reactions occurred.

A second series of 10 male students who had developed sensitivity when tested with methyl methacrylate monomer (see above) were tested using the Plexiglas discs. None of these individuals, although they had been proved sensitive to methyl methacrylate monomer, showed any reactions to the polymer.

The experiments on the pigmented denture materials were done on mice as follows: The materials in fine granular form were placed either subcutaneously or intraperitoneally in 40 mature female and male mice, 0.075 gm. in a gelatin capsule being implanted in each animal. These animals were kept for nine months, in individual cages, and examined weekly, to determine whether tumors would develop. Although a number of animals died from pneumonia and from other causes unrelated to the experimental procedure, none of them had tumors, nor did the remainder (31 animals) show any growths or other abnormalities on gross post-mortem examination at the end of the nine month experimental period. The powder was found adherent either to the skin or abdominal wall, in a thinly encapulated mass. No signs of irritation were present at necropsy nor were there any abdominal adhesions in those instances of intraperitoneal administration.

Summary

THE approximate toxicity of monomeric methyl methacrylate has been determined in experimental animals, by oral, intraperitoneal, and subcutaneous administration, as well as by inhalation and application to the skin. (2) Comparative experiments indicate that vapors of methyl methacrylate are more acutely toxic for mice than those of acetone, and less toxic than those of ethyl acetate. (3) The symptoms of methyl methacrylate poisoning were essentially those of depression, death apparently being due to respiratory failure. The effects of methyl methacrylate do not appear to be especially cumulative. (4) The most characteristic histologic changes noted in animals exposed for prolonged periods to high concentrations of methyl methacrylate vapors were degenerative changes in the liver. (5) On local application to the skin of rabbits methyl methacrylate caused signs of a fleeting, mild irritation. Instilled into the rabbit eye, it provoked considerable irritation which on occasion required several days for recovery. (6) By the patch test method, about one-third of the subjects studied developed a mild initial erythema at the site of monomeric methyl methacrylate applications. When tested 10 days later evidence of sensitivity was obtained in about 20% of the subjects. The polymeric form on the other hand when similarly employed provoked no signs indicative of irritation or sensitization. Furthermore, implantation into mice of the polymeric form did not provoke tumor growth.

References

1. DEICHMANN, WILHELM: Toxicity of Methyl, Ethyl and n-Butyl Methacrylate. *J. Indust. Hyg. & Toxicol.*, 23:343, 1941.
2. MAIN, R. J.: A Nebulizer for Inhalation Experiments. *Indust. & Engin. Chem.*, 12:117, 1940.

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The Scope of Industrial Sanitation

N. V. HENDRICKS, Ch. E.,
Industrial Hygiene Service,
Georgia Department of Public Health

AS APPLIED to industry, there are two interpretations of the term "sanitation." The old interpretation included only coverage of certain personal hygiene facilities such as toilets, showers, lockers, dressing rooms, and the like. Our present conception of industrial sanitation is broad and covers sanitation of the working environment as well as those indicated facilities for personal hygiene. Industry is coming to realize more and more the importance of the working environment as a fundamental factor associated with employee health and production.

The importance of adequate facilities for personal hygiene cannot be over-emphasized. Sanitation is a fundamental factor in the control of many communicable diseases. Time and again, poor personal hygiene has proved responsible for individual and group illnesses. Sanitation within the plant should bring the community effort along these lines down to the personal and individual basis. Municipal and other official agencies have done much toward safeguarding the general public by providing basic sanitary facilities for the protection of safe drinking water, proper disposal of waste, garbage, and the like. The average individual takes for granted these safeguards which have been placed about him.

A safe and potable water supply is of no less importance to the industry than it is to the community. Wherever possible, industry should give serious consideration to obtaining drinking water from an approved public supply. Where such a supply is not available or for other reasons cannot be used, the Department of Health should be consulted in the development of a plant water system. In many plants, two water systems are employed, one for drinking and personal uses, the other for either fire protection or plant processes. In too many cases, the second system carries polluted water which is unfit for human consumption. In addition, it appears common practice in some plants to connect these two systems by some means which results in what is commonly called a cross-connection. Such a condition is potentially very dangerous and such connections should not be permitted to exist.

Where city sewers are available, all domestic waste from plants should be discharged into these. Certain industries have by-products and waste materials incident to plant operations. When these materials are large in volume or toxic in nature, a real disposal problem is presented. In some cases, it is possible to discharge such wastes along with domestic sewage. However, where these wastes contain excessive amounts of organic materials, acids, alkalies and the like, they may interfere with the treatment of domestic sewage and in such a situation it is necessary or desirable to dispose of them separately. Again, this will vary with the particular process of the plant and each situation presents an individual problem.

The most common occupational disease is dermatitis or skin irritation. Probably personal hygiene accomplishes more in the control of this disease than does any other one thing. Therefore, it is obvious that washing facilities are of prime importance in industrial sanitation. This is especially true where irritating toxic and extremely dirty materials are handled or processed. Adequate washing facilities should be provided in all industrial plants.

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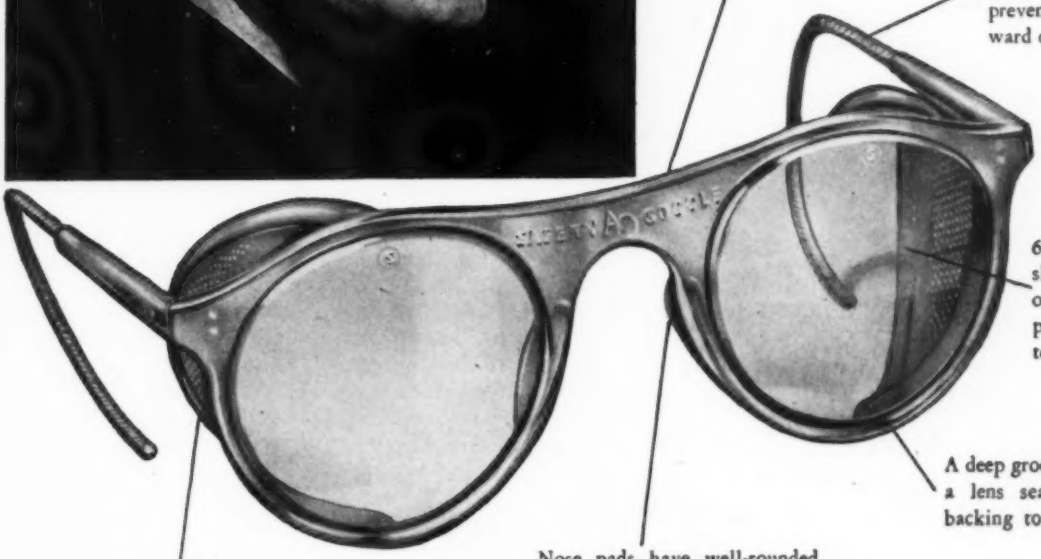

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Toilet facilities are an absolute necessity in industrial establishments. These should be provided in accordance with the needs of the plant and should at all times be kept in a clean and sanitary condition.

Industrial plants should provide locker facilities in accordance with the need of the workers. This is especially desirable where the individuals change from street clothes to working clothes and are exposed to dirty or irritating materials in the course of their work. In some cases, it is desirable to provide double lockers; one for the street clothes and one for the working clothes. Such locker facilities should be connecting with or adjacent to washing facilities. They should be under strict supervision and should be kept in a clean and sanitary condition at all times.

Good housekeeping is of major importance in the sanitation of any plant. This is particularly true where toxic dusts are generated or toxic materials handled. Poor housekeeping usually results in such materials being projected into the working atmosphere by the movement of men, working machines, parts, and the like. Good housekeeping is essential to good plant sanitation, and on the other hand, good plant sanitation is essential to good housekeeping. For instance, in some plants, extremely good housekeeping is the only control procedure needed for the alleviation of certain exposures.

Any program of industrial health should have in its administration a certain amount of thought along the lines of environment sanitation. Engineers and physicians in the past decade have done much toward developing techniques for the control of the working environment. The investigation and control of exposures resulting from the use of toxic materials should be included in the agenda of the health program of any plant where such materials are employed in processing.

Broadly speaking, environmental sanitation is concerned with the control of toxic and irritating materials present in the working atmosphere. These may be considered as chemical hazards as differentiated from certain mechanical hazards which are purely problems of safety.

Exposure to certain of these materials may result in the development of occupational diseases which are all too familiar. There are several classes of industrial materials which are primarily responsible for these exposures and the occupational diseases.

Organic solvents such as carbon tetrachloride, benzene, trichloroethylene, chloroform, carbon bisulfide and many others have assumed tremendous industrial importance. Since the outbreak of the war, there is practically no plant process which does not call for materials of this type at some stage or other. Formerly, the more toxic materials were replaced by substitutes which were of a less toxic nature. However, at the present time, due to the shortage of critical materials, many of the real toxic compounds are again found in industry. The action of these materials is much less dramatic than the picture presented by mechanical accidents, however, chronic exposure may bring about insidious results which are evidenced only after years of working with such materials. Any plant employing organic solvents should recognize the potential danger and take every measure to alleviate resulting exposures.

We are all familiar with certain dusts and diseases, of which classic examples are silicosis and asbestosis. Fortunately, dusts producing lung pathology are comparatively few, and the most important two have been named above. Exposure to these dusts exists in such

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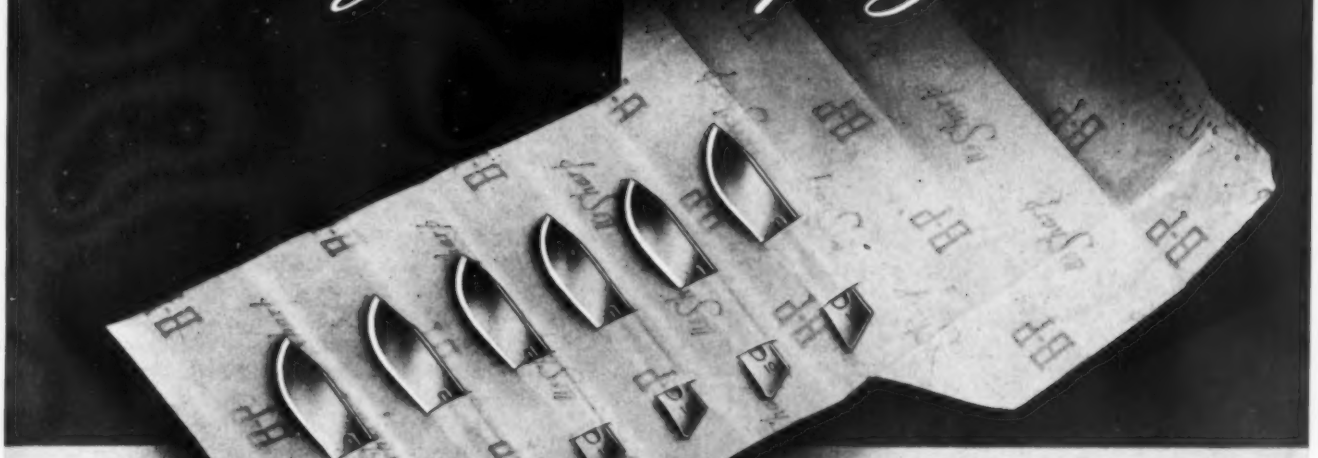

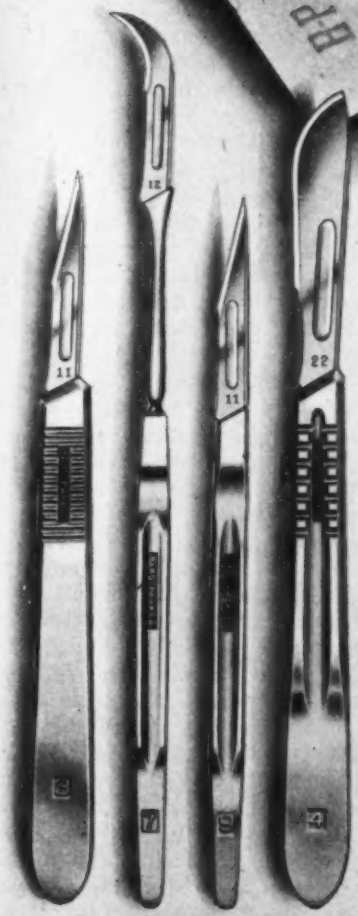

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industrial operations as abrasive cleaning, quarry industries, foundry work, and the like. Adequate control of industrial dust on plant scale involves major engineering considerations.

The toxic properties of certain metals have been forcibly brought to our attention during the present war effort. This is particularly true of the shipbuilding industry. Here exposures to such toxic materials as lead fumes, and zinc oxide are presented. Acknowledgment should be given to industry as a whole for their recognition and planning toward the control of these exposures. This is especially well illustrated by the tremendous outlay of ventilating equipment which is obvious in the average shipyard.

There are certain gases and mists of industrial importance which cause concern both to the individuals exposed and to those working on control procedures. Fortunately, many of these materials are irritating and make their presence known by these properties. On the other hand, gases such as carbon monoxide give no warning and their presence may be detected only after damage has been done.

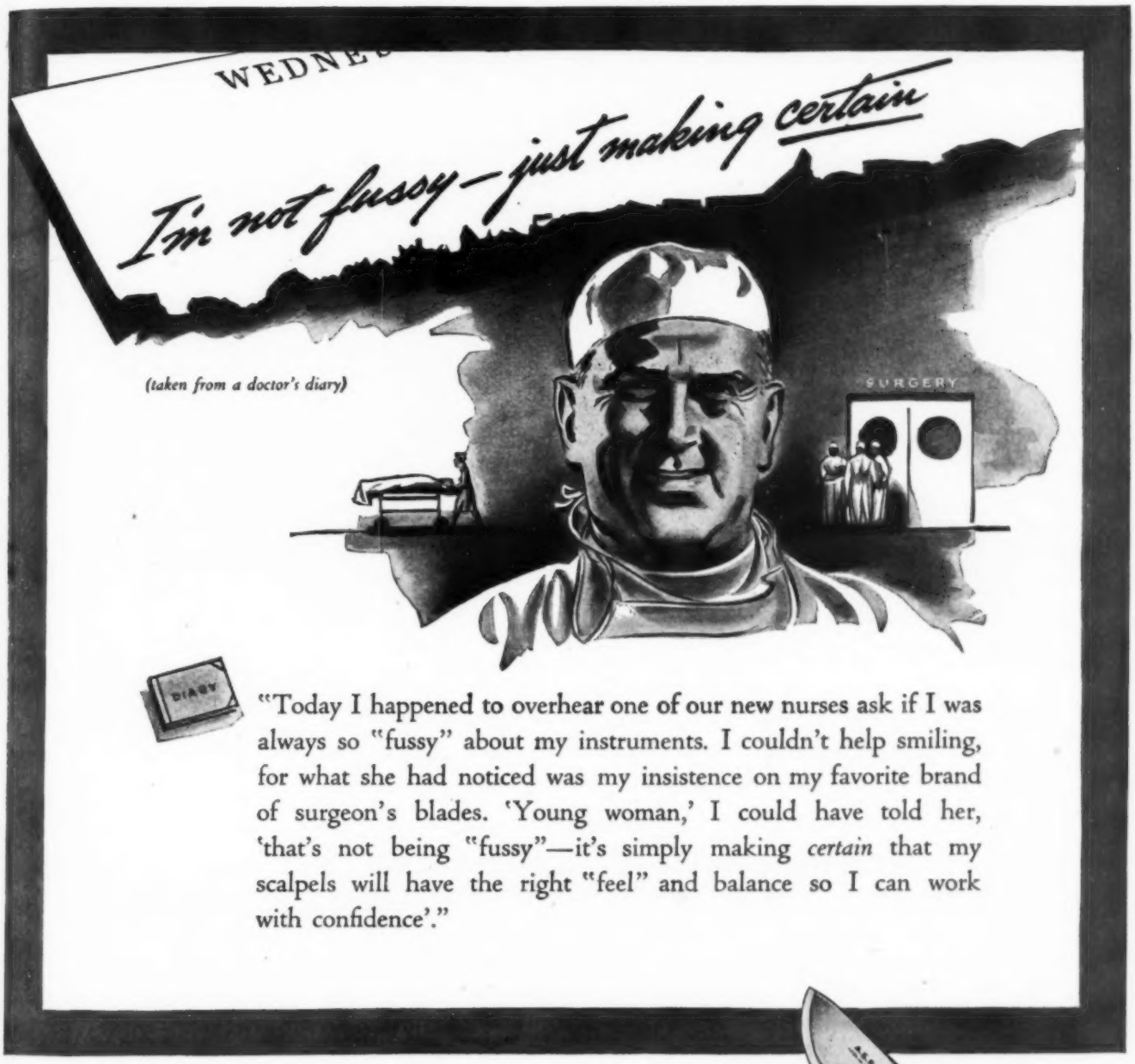
Many industrial plants employ engineers, chemists, and physicians. However, few of these individuals have the background and experience which gives them the "know how" for the proper investigation and control of environmental exposures. This is a specific job for the industrial hygienist. For the measurement of atmospheric contaminants special equipment and training are required. A thorough knowledge of chemistry and physical behavior of industrial materials is essential. In addition, special training in the analytical procedures for the determination of minute quantities of such materials is necessary. The average plant engineer and chemist does not have the required background for this type of work.

Each exposure presents an individual problem which must be handled as such. A thorough evaluation of individual exposures involves study of materials, toxicity, processing, concentration present in the atmosphere, etc. Unfortunately, there is often a series of materials present concurrently in the atmosphere and in many cases it is necessary to break these down or separate them into their component parts which results in a complex problem.

The control of the working environment calls for certain sanitary facilities which are somewhat different from those which are considered in the field of basic sanitation as necessary for good personal hygiene. Several methods are available by which control can usually be effected. These methods include: (a) Isolation of process. (b) Substitution of non-toxic material. (c) Wet methods. (d) Personal protective equipment. (e) General ventilation. (f) Local exhaust ventilation.

Each of these methods is applicable to certain exposures but on the other hand has definite limitations. In general, where plant processing is involved, local exhaust ventilation offers the logical approach to the control of dispersed materials. By this procedure, such contaminants are captured at their point of generation and are thus removed from the working atmosphere before coming into the breathing zone of the employee.

The above points have been noted with the thought of presenting some of the specific problems with which environmental sanitation is concerned. It appears that the problem is much broader in its scope than merely the provision of facilities for creature comfort and personal hygiene. The matter of a safe and sanitary working environment is being recognized as of prime importance. Progressive industries



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have come to assume the responsibility for the correction of such exposures and are making every effort to apply sanitation to every department of their individual plants.

Management of Physically Handicapped Personnel

FRANK L. MORTON, *Major, Medical Corps (AUS), Director, Industrial Medicine Section, Warner Robins Air Technical Service Command, Robins Field, Georgia*

RECENT developments at home and abroad have revealed to a startling degree the urgency of the current manpower situation. When octogenarians and pregnant women are pressed into service on the industrial front, it is obvious that there is work for every person who is capable of performing one job or another. Physically handicapped persons have played and will continue to play a highly significant role in our industrial effort. Their employment has not only provided a stop-gap source of employees in industry, but it has also made possible the utilization of able-bodied individuals in the armed services. As increasing numbers of disabled veterans are returned to civilian life the experience derived in the conduct of handicap programs will prove invaluable in assimilating this group. In short, the employment of handicapped persons can no longer be considered a temporary measure. After the war, it will be a MUST in industry. In Public Law 346, 78th Congress, the legislative body has expressed its viewpoint on this matter in the following terms: ". . . Congress declares as its intent and purpose that there shall be an effective job counseling and employment placement service for veterans, and that, to this end, policies shall be promulgated and administered, so as to provide for them the maximum of job opportunity in the field of gainful employment . . ."

In this presentation it will be possible only to outline the essentials of a handicap program, to refer to a number of problems encountered and to summarize our observations regarding the efficiency of various categories of handicapped workers. The facts are based on an 18 months' study of physically handicapped employees working at the Warner Robins Air Technical Service Command. The latter is an installation of the Army Air Forces located in Robins Field, Georgia, and designed to perform extensive maintenance, repair and supply of aircraft. The employees at this installation have been drawn largely from the surrounding rural areas of middle Georgia. They have had little or no industrial experience before this war. All are Federal employees subject to the regulations of the U. S. Civil Service Commission.

Before discussing the mechanics of the program at Warner Robins Air Technical Service Command, the essentials of any program of this type may be listed. It is emphasized that the fundamental character of these programs need not differ for private or governmental, large or small industries. Briefly, we state the essentials to be:

1. Proper evaluation of the physical requirements of the position. This is the starting point of the entire procedure for the employment of handicapped persons. Usually, adequate evaluation of physical requirements can be gained only by experience in observing employees working at different types of jobs. There is no substitute for thorough and repeated observations by the plant physician. Frequently, studies are made by job analysts or members of the Personnel Department, but unless they are closely integrated with or supervised by the Medical Department they have little value from the standpoint of placing a physically handicapped employee. Job analysts are concerned primarily with increasing the efficiency of operations and it is only rarely that they are qualified completely to disassemble a job performance into its physical and environmental factors. Similarly, we do not rely upon lists of requirements established by agencies outside the plant, regardless of the undoubted competence of the persons making these studies. Jobs of the same designations differ too widely to permit a wholesale transferance of physical requirements from one plant to another.

2. Determination of the physical fitness of the applicant for the job assigned. This is of course determined at the time of pre-employment examination. It should be the aim of the plant physician to match the requirements of the job assignment with the limitations of the employee, as determined by examination.

3. Placement of the physically handicapped employee through the coordinated effort of the Industrial Medical Section and the Placement Unit. Placement is the keystone of performance in the case of physically handicapped employees. The physical limitations which have been found at the time of examination must be transmitted to the members of the Placement Unit and to the operating activity in such terms that there will be no confusion in deciding on the proper job.

4. Re-examination of the handicapped employee at intervals in order to determine his continued fitness for the work assigned. Re-examination of employees with progressive handicaps is particularly important. A man with a mild degree of hypertensive heart disease may be fully capable of working as an aircraft engine mechanic when he is first employed. Six months later, however, his condition may have deteriorated to the point where he is physically unfit for the designated task.

5. A knowledge of the problems and a willingness to assist in their solution on the part of the supervisor. As will be indicated later, the ingrained prejudice of supervisors toward physically handicapped employees is one of the most difficult obstacles to overcome.

WITH some variations these five essentials form the basis of the program which has been developed at Warner Robins Air Technical Service Command for the management of physically handicapped employees. All appointees for employment receive a complete physical examination including chest x-ray, blood Kahn test, urinalysis and complete blood count, the latter if indicated. At the time of this examination there is available to the examining medical officer a copy of the job description prepared by the supervisor who will employ the individual. This job description, supplemented by the experience of the examining physician, determines the physical requirements of the position. Employees who are physically handicapped are given a "job limitations" card which indicates the operations or factors to which they may not be exposed. Copies of this card are sent to the Personnel Office and thence to the unit foreman or supervisor. The card has the advantage of not stigmatizing the employee and, at the same time, of providing a means of identification and a re-examination record. Employees with stable or non-progressive handicaps are re-examined at intervals of six to 12 months; those with progressive conditions are recalled at shorter periods. To implement the conduct of this program a number of measures have been introduced at Warner Robins Air Technical Service Command. One of these is the follow-up of all physically handicapped persons by the Placement Unit

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DATE OF ISSUE_____

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Fig. 1. Outside of "Job Limitations" Card

This employee is limited in the functions he, she can perform. He, she must not be transferred to other duties, temporarily or permanently, without notifying the Medical Department. Work assigned must not include or require the following:

PHYSICAL FACTORS

_____1. ARMS:
- _____Holding
- _____Hammering
- _____Flexion
- _____Extension

_____2. FINGERS:
- _____Grasping
- _____Pulling

_____3. TRUNK:
- _____Bending
- _____Twisting

_____4. LEGS:
- _____Continuous standing or walking
- _____Running
- _____Climbing stairs
- _____Climbing ladders or overhead

_____5. WEIGHT LIFTING:
- _____Any weight
- _____Above 30 lbs.

_____6. GOOD HEARING:

_____7. ACCURATE VISION:
- _____Near vision
- _____Far vision
- _____Depth perception
- _____Color discrimination

_____8. MOTOR VEHICLE OPERATION

_____9. WORK AROUND MOVING MACHINERY

ENVIRONMENTAL FACTORS

_____1. Excessive light
_____2. Excessive heat
_____3. Excessive noise
_____4. Dusts
_____5. Gases or fumes
_____6. Toxic solvents (vapors or liquids)
_____7. Radioactive materials

SIGNATURE OF MEDICAL OFFICER

Fig. 2. Inside of Card

working in close coordination with a specially trained nurse of the Industrial Medical Section. Regular follow-up visits are made 15 days after the initial placement of a handicapped employee to determine the adequacy of this placement. In addition, a series of conferences on the management of physically handicapped persons have recently been held for all supervisors. These conferences last 30 minutes and are illustrated by lantern slides. They stress the role of the supervisor in achieving maximum production through proper utilization of handicapped personnel.

In classifying physically handicapped employees we use categories established by Lt. Col. George Sladczyk, of the Industrial Medical Section at Hq. Air Technical Service Command in Dayton, Ohio. Handicapped persons are grouped into five categories: orthopedic, vision, hearing, chronic diseases and miscellaneous.

For each of these groups statistical data have been accumulated and may now be presented.

The Job Limitations card (Figs. 1 and 2) describes the methods employed at Warner Robins Air Technical Service Command for limitation, identification and re-examination of handicapped personnel. The card is kept with the employee at all times.

JOB LIMITATIONS

(To be prepared in triplicate)

_____194_____

Two (2) copies to:_____ _____
(Personnel Officer or Adm Asst) (Activity Concerned)

One (1) copy to WRMC 2 to be filed with CSC Form 2413.

_____is limited in the functions, he or she can perform. He or she must not be transferred to other duties, temporarily or permanently, without notifying the Medical Department. Work assigned must not include or require the following:

PHYSICAL FACTORS

_____1. ARMS:
- _____Holding
- _____Hammering
- _____Flexion
- _____Extension

_____2. FINGERS:
- _____Grasping
- _____Pulling

_____3. TRUNK:
- _____Bending
- _____Twisting

_____4. LEGS:
- _____Continuous standing or walking
- _____Running
- _____Climbing stairs
- _____Climbing ladders or overhead

_____5. WEIGHT LIFTING:
- _____Any weight
- _____Above 30 lbs.

_____6. GOOD HEARING:

_____7. ACCURATE VISION:
- _____Near vision
- _____Far vision
- _____Depth perception
- _____Color discrimination

_____8. MOTOR VEHICLE OPERATION:

_____9. WORK AROUND MOVING MACHINERY:

ENVIRONMENTAL FACTORS

_____1. Excessive light
_____2. Excessive heat
_____3. Excessive noise
_____4. Dusts
_____5. Gases or fumes
_____6. Toxic solvents (vapors or liquids)
_____7. Radioactive materials

Medical Corps

I have read and thoroughly understand the above recommendations.

W4—1636 Signature of Employee

Fig. 3. Job Limitations Form

The Job Limitations form (Fig. 3) contains the same information as the card and is transmitted to the Personnel Office and the unit foreman.

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TABLE 1.
HANDICAPPED PERSONNEL DATA

Handicap	Average Total	Sex		Average Duration of Employment	Average Age
		Male	Female		
Orthopedic	259	229	30	16 months	34.0
Vision	265	204	61	9 months	34.5
Hearing	27	21	6	16 months	34.5
Chronic	901	725	176	15 months	42.5
Miscellaneous	265	251	14	16 months	41.0
All Handicaps	1717	1430	287	14 months	37.3

The widespread use of handicapped individuals of all categories is obvious.

Males outnumber females approximately four to one, and the chronic disease group outnumbers all other types of handicaps.

The higher average age of persons with chronic diseases and miscellaneous handicaps is shown. This is largely accounted for by the incidence of cardiac disease, hernia, etc., among older members of the employee population.

Worthy of note in Table 2 are the markedly lower rates of sickness frequency and disability and the slightly higher severity rate, as compared with data for the entire Field.

TABLE 3.
ANALYSIS OF SEPARATIONS

Handicap	% Total Strength	% Separations
Orthopedic	2.2	0.9
Vision	2.3	1.1
Hearing	0.2	0.1
Chronic	7.6	3.7
Miscellaneous	2.3	0.5
All Handicaps	14.6	6.3

The injury figures are too low to permit comparisons.

The rate of separations (see Table 3) for handicapped personnel is much lower than that of the Field as a whole.

This is true of each handicap category as well as of the entire field.

PHYSICALLY handicapped employees have been found to be, in general, as efficient as the others when placed properly.

They encounter no greater difficulty in carrying out the requirements of their job assignments. It has been our experience, however, that certain categories of jobs cannot satisfactorily be held by handicapped employees. Such job designations as laborers and

TABLE 2.
SICKNESS ABSENTEEISM, DECEMBER, 1944

	ILLNESS			INJURY		
	Frequency	Severity	Disability	Frequency	Severity	Disability
Orthopedic	223.9	2.61	0.586	3.86	2.0	0.007
Vision	264.1	1.98	0.523	3.77	1.0	0.003
Hearing	370.3	2.25	0.833	0.00	0.0	0.000
Chronic	228.6	2.67	0.611	1.10	7.5	0.008
Miscellaneous	271.6	2.87	0.782	11.30	1.0	0.011
All Handicaps	271.7	2.47	0.667	4.00	2.30	0.006
Robins Field	500.8	2.23	1.120	5.70	5.48	0.031

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custodians require varying and elastic types of work performances which generally impose an excessive burden on supervisor and employee alike. A laborer, for example, may be required on successive days to pick up papers, tend furnaces, or haul lumber. Because work of this kind is not as clearly defined as other activities like Aircraft Instrument Mechanic, physically handicapped personnel have not turned in satisfactory performances.

The great majority of physically handicapped employees have been grateful for the opportunity to hold a remunerative job. In many instances it represents the first gainful employment which they have had in many years.

A number of employees have even improved the efficiency of certain operations by virtue of their limitations. A 42 year old machinist, for example, was handicapped by the loss of one arm one inch below the elbow. In an effort to adapt himself to the work on milling and shaping machines he studied the individual operations and eventually devised a simplified layout procedure. As a result, he was able to do his work more efficiently and in less time than his normal co-workers.

Most physically handicapped employees are well accepted and treated by their co-workers. Occasionally, an employee will lack confidence in a handicapped colleague or may even refuse to work with him. In one unit, three employees refused to permit a physically handicapped worker to lift crates with them, for fear that he might "break down." The man in question had a visual handicap which in no way impaired his capacity for the work assigned.

Employees with disfiguring handicaps are not well received by their co-workers.

We recall the case of a young woman with Huntington's chorea who was qualified for appointment as storekeeper in a clerical capacity. Subsequently, it was necessary to give her a disability discharge because her colleagues simply could not accustom themselves to her eccentric movements. On the other hand, employees with amputations appear to get along very well. The cry of favoritism is sometimes raised when a handicapped employee is transferred to the day shift or to a lighter job. Usually, a few words of explanation from the supervisor will dispel the dissatisfaction created.

A more serious problem relates to the attitude of supervisors who deliberately refuse to promote physically handicapped employees to jobs of greater responsibility. In spite of personal discussions and conferences, a number of supervisors feel that handicapped employees are not capable of doing a full day's work, are over-paid and not deserving of promotion. Much progress remains to be made in acquainting supervisors with the necessity of utilizing handicapped employees and with their generally high standard of performance.

THERE are not many fields of medicine in which more has been written and less accomplished than in the study of the limitations of physically handicapped persons. Limitations are made on the basis of the best available medical opinion, but few genuine studies have been found. It appears that the determination of the exact work capacity of an individual is not a simple matter. It depends on a great variety of personal as well as medical factors and will vary with individuals. Is it sound economics or good industrial medical practice to limit an employee with hypertension for certain weight lifting activities when he carries on much more arduous duties on the farm in the other 16 hours? Only intensive studies on the large numbers of handi-

capped now employed will provide the answers to this and related questions.

Time does not permit a detailed discussion of the individual handicap categories, but a few observations may be of interest:

(a) *Orthopedic*: These are highly satisfactory and appear to present no special problems when housing and transportation facilities have been procured.

(b) *Vision*: The major difficulty here is one of placement.

(c) *Hearing*: These represent too small a number to permit observations.

(d) *Chronic Diseases*: Employees with heart disease, arrested pulmonary tuberculosis and asthma are highly satisfactory. In our experience diabetics, and employees with gastro-intestinal complaints do not carry on well because of the difficulty in obtaining proper diet, and adequate rest.

(e) *Miscellaneous*: Employees with hernia, varicose veins or skin conditions have given us very little trouble.

ON THE basis of our observations here the following conclusions may be presented:

1. Physically handicapped employees are good employees. They are efficient and have lower rates of sickness absenteeism and separations than the field as a whole.

2. The administrative phase of a handicap program presents many problems. Most of these can be resolved by the willingness of supervisors to accept and to place handicapped employees.

3. The determination of the work capacity of the handicapped is an untouched field and stands as a challenge to industrial physicians.

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INDUSTRIAL HEALTH and DISEASE

Some Techniques of Modern Industrial Medicine

R. M. WATROUS, M.D.,
Plant Physician, Abbott Laboratories

INDUSTRIAL medicine is a distinct and highly specialized field of practice. The physician engaged in it finds the bulk of his time occupied with matters quite different from those which occupy the general practitioner or any other specialist, and, as in any specialty, he finds great demands being made on certain special skills and information which he must acquire and improve.

The most important way in which industrial medicine differs from other fields of practice is its almost exclusive concern with prophylaxis rather than with treatment. It is preventive medicine on a large scale; its "patients," if we may call them that, are in the main people in good health—they have to be, or they would not be able to work regularly. The most important duty of the industrial physician in regard to these people is to ensure, in so far as he is able, that they remain in good health. He must accomplish this mainly by exercising control over their working environment, and the extent to which he is able to do this in a well-organized factory is so great that it merits careful attention. Just consider for a moment the life of an average factory worker. He lives 24 hours a day, or 168 hours a week. Of those hours, he spends 40 to 48, or roughly one-fourth, in his working environment. This goes on year in and year out. What other branch of medicine can control the environment of a patient one-fourth of the time throughout his working life? Because of this, no amount of care, thought or consideration which the industrial physician may bestow on the healthful condition of the worker's environment can be too much in view of the tremendous importance such care is bound to have in the total picture of the workman's health.

It may be questioned how much an industrial physician is able to modify the environment of workmen; or why the management of a factory should pay any attention to the recommendations of the plant physician, especially if those recommendations require costly alterations in buildings and equipment. The answer is very simple: The less enlightened and the more shortsighted the management is, the less attention it will pay to such recommendations. The more enlightened, the more farsighted the management, the more it will be guided by this type of advice—for where could it get any better? Who else is competent to inform management just which things are unhealthful and which are not? Modern industries have become thoroughly accustomed to pay for, and act on, the advice of technical experts. Merely from a monetary standpoint, there are great advantages in having healthy workmen in a factory, just as there are enormous disadvantages and many hidden financial losses in having unhealthy workmen. In addition to the pecuniary considerations, there are very important advantages in employer-employee relations, morale, and job-satisfaction to be gained by following the advice of a competent industrial physician concerning a healthful environment for the workers. The fact is that today, in any industry receiving really competent industrial medical service, the industrial physician in charge is absolutely the final authority on all matters which concern the health of the employees, and the management would no more dare to act contrary to his recommendations than they would dare to subject a boiler to twice the amount of steam-pressure recommended by a competent engineer. I know of some factories in which the plant physician has full power to walk into any production department and order a shutdown if he feels that an urgent health-hazard has suddenly arisen. Naturally, he must be sure of his grounds, and must not abuse his great responsibility, but a man with proper training will not do that anyway.

To deserve this degree of confidence, and to discharge this serious duty to thousands of workmen who depend upon his knowledge, the industrial physician must acquire a special body of information which, by its exent and complexity, fully entitles him to regard his field as a true specialty. Modern technology is developing at a dizzy rate. The most advanced researches of chemists, physicists and engineers are constantly finding application in factories. The result is that new and unfamiliar materials, energies and methods are constantly impinging on the daily life of the factory worker. Now, this worker has neither the time nor the background to understand all the potential dangers which confront him in the use of new substances; all he can do is follow the instructions his foreman gives him. But what of the foreman? He, too, has only a limited knowledge—sometimes none at all. He must depend on the instructions furnished by the engineer who designs the process. And what of the engineer? What is there in his training which would enable him to understand or evaluate the possible effects on health of a new material or process which he sees only from a mechanical or chemical viewpoint? It is plain that somewhere in this chain of supervision there has to be a physician specially informed on toxicology, and with a very good working knowledge of chemistry and physics, if serious difficulties are to be avoided. He must know the details of every operation carried on in the factory, and though he may get this information from others, he cannot rely entirely on their word; he must inspect the operations himself at frequent intervals in order to know the true state of affairs. No material, source of energy, process, or machine can safely be outside the range of his knowledge if factory workers are exposed to it.

To cite a few examples: a factory had difficulty with the growth of mould in certain bottles of liquid which were put up on a production line. The engineers decided to utilize the germicidal effect of the mercury-vapor lamps known as "steri-lamps,"

Read before the Lake County (Illinois) Medical Society, February 13, 1945; published in *Bulletin of the Lake County Medical Society*, March, 1945.

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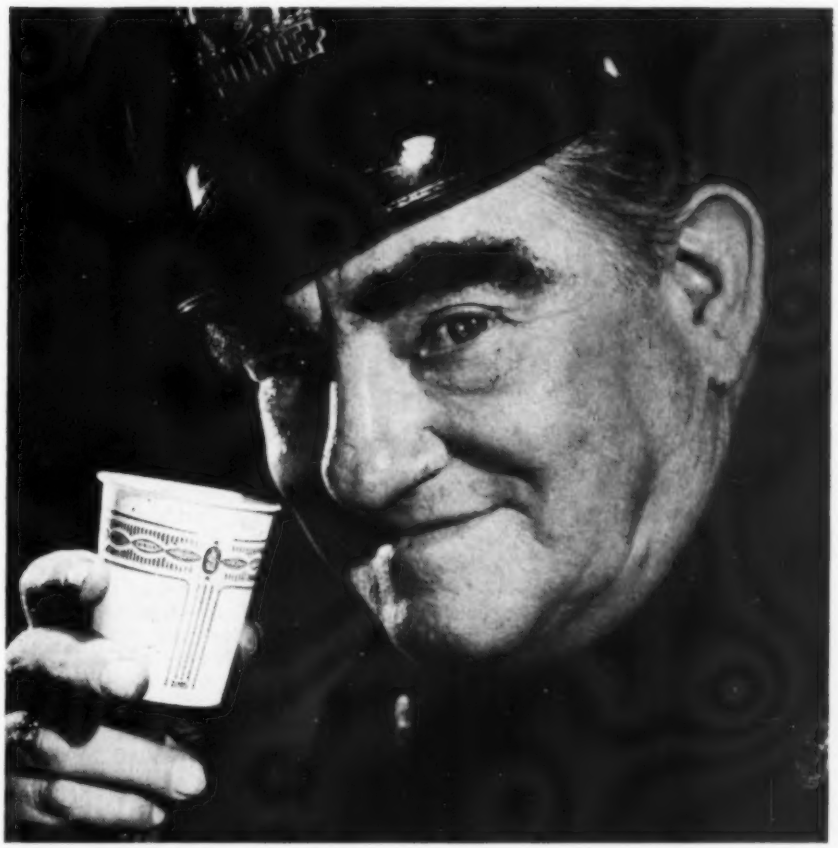
and these were installed in such a way as to radiate on the bottles. They had some vague notion that the rays from these lamps might be harmful, but their idea of protection was to supply deeply-tinted goggles such as those worn by welders. The general illumination in the room was not bright enough to enable workers equipped with these goggles to see what they were doing. The result was that no goggles were worn, and several cases of severe actinic conjunctivitis occurred. What no one knew, but what a properly-trained industrial physician would be duty-bound to know was that ordinary clear glass effectively filters out the actinic rays from this type of lamp, and the workers could have been effectively protected by ordinary safety goggles.

In another case, a manufacturer was much worried by the fact that a finely-powdered mixture of quartz and glass used in his factory presented the constant danger of silicosis among the workmen. The only reason for using quartz was because it had a cuboidal grain structure. What this manufacturer did not know, but what an industrial physician in such a plant would be duty-bound to know, was that while crystalline silicon dioxide, or quartz, is a potent inciter of silicosis, many silicates having the required grain structure are relatively innocuous. Once supplied with this single bit of information, the manufacturer was able to eliminate the silicosis hazard.

Not all questions of industrial hygiene and toxicology can be solved in any such simple manner. Very often the industrial physician is called upon to evaluate the hazard to health of some common poison which is handled in the factory under his care. Such materials as lead, mercury and arsenic have been known through the centuries as industrial poisons, but their usefulness is such that they must be handled regardless. Each is the subject of a great body of literature, but modern studies have nevertheless modified many of the older accepted axioms. In the case of lead, for example, Kehoe and others,[1] working at the Kettering Laboratories, have recently completed a piece of work which will modify many previous ideas on the subject of lead poisoning. For periods of months at a time they measured the lead content of all food and drink consumed by test subjects, and accurately determined at the same time the lead content of the excreta. Then the subjects were given a small daily dose of lead, and the same measurements were continued. The experiments showed conclusively that lead is not, as many believe, a substance which is permanently retained in the body. Instead, the body showed a definite ability to

1. KEHOE, R. A., CHOLAK, J., HUBBARD, D. M., BAMBACH, K. and MCNARY R. R.: Experimental Studies on Lead Absorption and Excretion, etc. *J. Indust. Hyg. & Tox.*, 25:71, February 1943.



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excrete lead, and up to certain limits, the amount excreted increased in proportion to the amount taken in. Only when the excretory power of the body was exceeded by the lead intake did cumulation begin. As an interesting sidelight, none of the drugs or chemicals commonly supposed to "mobilize lead from the bones," or to help "fix lead in the bones" had the slightest effect on lead excretion. Other investigators,[2] working in industries where lead exposure must be carefully watched, have found that the time-honored stippled red cell is a very unreliable guide to early lead poisoning; these cells occur in a significant proportion of people not exposed to lead and they do not by any means always appear in those who absorb considerable amounts of lead. The classical signs of advanced lead poisoning are, of course, only of academic interest to men whose concern is to prevent any such signs from appearing. Practical control of lead exposure as practiced by industrial physicians today is an elaborate administrative job, and the chief laboratory tools are very sensitive analytical methods. One of these, the dithizone method, is very widely used to determine the lead concentration in urine or in air samples collected by special apparatus at various locations throughout the plant. Another very useful apparatus for this purpose is the falling mercury drop potentiometer, in which the conductivity of a solution is measured in relation to an applied voltage. The readings are plotted as a curve, milliamperes against millivolts, and this curve shows sharp changes in slope at definite points when certain metallic ions are present in the solution. The curves are characteristic for any given metal, and can be interpreted directly in terms of micrograms of metal present. A proper lead control program thus requires observation of working conditions, comprehensive air-sampling (because the most important route of absorption is the respiratory tract), a conference with the engineering department to specify where and how proper protective ventilation is to be applied, a program of instruction which must reach every workman if any special personal hygienic measures are required, the provision of such things as showers and daily change of work-clothing if these are indicated, and finally, as a check on the whole program, some system of periodic physical examinations with appropriate laboratory tests, such as an analysis for lead in blood and urine, to catch any individual who might have slipped through the meshes of the elaborate net of precautions thrown around him.

In the case of arsenic, a very similar program may be required. Here, one useful laboratory tool is the very sensitive Gutzeit test, a modification of the older Marsh test. This method is adaptable to the analysis of air samples, blood or urine. Organic matter must be destroyed by a wet combustion with acids. The digested sample is then placed in a gas-generator bottle and arsenic-free zinc is added. The nascent hydrogen evolved in this procedure reduces any arsenic present to arsine, a gas which passes out through filters designed to remove any traces of hydrogen sulfide, and impinges on papers impregnated with mecuric bromide. Arsine produces a characteristic brown stain on this paper, and by comparison with the stain produced using a known amount of arsenic, the method may be made quantitative. The test is sensitive to one microgram of arsenic—a thousandth part of a milligram. The same method may be applied to the analysis of hair and fingernails.

As all syphilologists are aware, the toxicity of arsenic is greatly modified when it is administered in organic combination. For this reason, it is important to know whether any exposure to arsenic involves organic or inorganic compounds. Antisyphilitic remedies are all based on a combination of arsenious acid with aniline, and there is good reason to believe that in the main all such organic combinations pass through the body relatively unchanged. We all know that the intravenous injection of twenty-four hundredths of a gram of arsenic trioxide is vastly more toxic than the injection of six-tenths of a gram of neoarsphenamine, though both contain the same amount of arsenic. For this reason, the amount of arsenic excreted in the urine of workmen is not in itself a sufficient measure of the toxicity of the compounds absorbed. It is necessary in addition to know the form in which the arsenic was absorbed. What would indicate a serious arsenic exposure in a fruit-sprayer might be quite innocuous in a chemical worker engaged in the manufacture of arsphenamine. In studies which I have made for the past two years of the absorption and excretion of arsenic in a group of arsphenamine handlers, values up to 3 milligrams per liter of urine have been compatible with excellent health, though these values would be considered quite high in fruit-sprayers, who use inorganic arsenic compounds, such as lead arsenate.

In the case of benzol, a solvent widely used in industry, the industrial physician has available a large body of literature for his guidance; benzol, like the older heavy metals, has been in use for many years. To say that this poison is well-known, however, would be incorrect, because the peculiarly insidious nature of its action is still far too widely unappreciated. The depression of the bone marrow caused by chronic benzol absorption gives rise to no characteristic symptoms until it reaches a very advanced—sometimes incurable—stage. For this reason, a prophylactic program is essential; a therapeutic program, by its very definition, would be doomed to frequent failure. Many ingenious methods have been devised to detect the earliest signs of benzol absorption. One of these depends upon the observation that benzol is detoxified in the body by coupling with the sulfate radicle. This causes the ratio of inorganic sulfate to ethereal sulfate in the urine to be markedly altered. In an unexposed person the inorganic sulfate in the urine should be around 90% of the total; with significant exposure to benzol, the inorganic sulfate may be as little as 40%. In a good many plants, urinary sulfate determinations are made as frequently as twice a month on all workers exposed to benzol. If any group shows signs of benzol absorption, the men are removed from that operation and engineering methods are applied to reduce the exposure. The urinary sulfate test should always be supplemented by periodic blood counts, in which the features especially to be observed are the total red count, the total white count, the ratio of granulocytes to lymphocytes, and the presence of any immature or abnormal red or white cells in the differential smear. In such a program, which has been in effect under my supervision for several years, it was found convenient to divide all counts into three arbitrary classes, having regard for the limits of normal observed in the healthy population of this area. In this way, an abbreviated record of the counts on all employees could be kept on one master chart, by using marks of three different colors, black for normal, green for suspicious, and red for abnormal counts.[3] As an example of the amount of work required by such a system, its application to a group of about 200 men involved making and recording approximately 1,300 complete blood counts in a period of three years. However, the trouble was well worth while, since five cases of incipient bone-marrow damage were detected in an early stage. The patients were removed from the exposure and their blood counts returned to normal, where they have remained for several years. Another valuable adjunct to a benzol-control program is air-sampling. This may be done in a variety of ways, but one of the most convenient and sensitive tests consists in gathering the air sample in a glass separatory funnel, which is closed and brought back to the laboratory for analysis. The benzol is nitrated by allowing 2 cc. of nitrating acid to stand in the closed funnel overnight. The acid is neutralized, and the nitrobenzol is extracted with methyl-ethyl ketone. After separating the ketone layer, more alkali is added and a deep purple color forms due to the combi-

2. Sanders, L. W.: Measurement of Industrial Lead Exposure by Determination of Stippling of Erythrocytes. *J. Indust. Hyg. & Toxicol.*, 25:38, February, 1943.

3. Watrous, R. M.: Benzol Poisoning. Method for Its Control in a Light Chemical Plant. *Industrial Medicine*, 12:832, December, 1943.

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nation of the ketone with the nitrobenzol. The intensity of the color is matched with that of standards prepared from known amounts of nitrobenzol, and the result calculated as parts per million of air by volume. This method readily detects as little as 10 parts per million of benzol—an amount considered by many to be well below that which can be tolerated eight hours a day with safety.

Matters such as those just discussed are routine in modern industrial medicine; in any well-run factory where such hazards exist, the appropriate medical control program is adopted as a matter of course, and requires only administration and checking on the part of the physician in charge. In a similar category are all the other routine duties, such as inspection of sanitary facilities, the maintenance of hygienic conditions in any food-dispensing accommodations which may be present, the proper placement of workmen based on pre-employment physical examinations, and many other activities of a general hygienic and public-health type. An important by-product of these systematic activities and repeated examinations is the detection of minor defects and abnormalities which may be corrected by outside medical care. The treatment of these conditions is entirely outside the scope and duty of the industrial physician, but it is manifestly his obligation to exert as much persuasion and pressure as possible to induce these patients to consult their own family physicians. As an example, 206 such referrals were made from my own department in the past year. A small but important number of cases of syphilis and tuberculosis is bound to be discovered by such repeated examinations, and these are of course referred for outside care. There is thus no overlapping between the field of the full-time industrial physician and the private practitioner; indeed, each can supplement the work of the other to the great benefit of the patient.

As has been stated, the ordinary examinations and programs for the control of known industrial hazards are routine administrative matters in a properly-organized industrial medical department. The special problems, which challenge the best skill and discrimination of the industrial specialist, arise when new and unknown hazards present themselves in the factory. Here, the specialist is offered the opportunity to do original research in the field for which he is trained. The clinical evidence must be assembled and sifted with all the care required in establishing any new disease entity. The working environment must then be subjected to observation, testing and analysis of the most rigid sort to detect the presumed cause. In this phase of the investigation, specialized knowledge from the widely divergent fields and literature of chemistry, physics and engineering must be brought to bear. Finally, when the presumed cause for the symptoms has been found, conclusive experiments must be planned and carried out to prove that this cause and no other is really the etiologic factor. As anyone will realize, the proof of the relation of a given cause and a given effect is the basic problem of science. It cannot be carried on in an armchair, and he who attempts to meddle with it outside his own field is likely to go far wrong. With the charming conviction of ignorance, many workmen do not hesitate to tell the industrial physician in no uncertain terms just what the cause of their particular symptoms is, and they must be forgiven because they do not know any better. It is a more difficult matter, however, when they carry these ideas to their private physicians and the latter accept their theories as to the cause of illness. In general, I believe a general practitioner should not attribute a disease or a symptom to an industrial exposure as a cause unless he himself has personal knowledge of the extent and degree of that exposure, and unless he has made reasonably sure that all other likely causes have been ruled out.

It might be of interest to describe some of the special apparatus used for the investigation of occupational hazards. The midget impinger is very commonly used to trap dust particles contained in a measured volume of air. Air is drawn out of the side-arm on a glass cylinder under a constant negative pressure furnished by a motor- or hand-operated pump. Outside air enters through a central tube, and acquires a rather high velocity in passing through the nozzle at its tip. This air stream impinges on the bottom of the apparatus and undergoes a violent change of direction which throws out the dust. The liquid in the cylinder, washing intermittently over the bottom, takes up the dust. The midget impinger is calibrated to sample one cubic foot of air in 10 minutes. If the dust is insoluble, the fluid in the impinger is thoroughly mixed, diluted to a measured volume, and the dust particles are counted with a microscope in an apparatus which is similar to a hemocytometer. Soluble dusts may be determined by chemical methods. To trap vapors, various types of bubblers are used in connection with calibrated pumps. Another dust trap, designed to handle much larger volumes of air, is the electrostatic precipitator. A motor-driven fan of the vacuum-cleaner type, draws air through a metal tube at the rate of about 10 cubic feet per minute. The outer tube forms one electrode of a high-voltage circuit supplied by a spark-coil. Inside the tube is a wire, which forms the other electrode. The voltage is adjusted so that a glow-discharge, but no spark, passes between the wire and the tube. This is very effective in precipitating even the finest dusts on the tube, At the end of the sampling run, the tube may be washed out with water and a microscopic count may be made on the washings, or the tube may be weighed accurately on a chemical balance before and after the run, thus giving the weight of the trapped dust. The explosive vapor meter is a versatile instrument adapted to the measurement of many organic vapors where they occur in high concentrations. Air containing the vapor is drawn by a suction-bulb through flame-arresting screens into a chamber containing a specially treated wire coated with a platinum catalyst. The catalyst causes the vapor to burn on the surface of the wire, thus raising its temperature. As the temperature rises, the resistance of the wire is changed, and the balance of the Wheatstone bridge, of which it forms one part, is disturbed, causing a galvanometer needle to move. The scale is calibrated in percent of explosive concentration for some given solvent, but a chart can be constructed to translate these scale readings into parts per million of many different solvents. For the more toxic solvents, this instrument is not sufficiently sensitive, and more refined chemical methods of air-sampling must be used.

Summary

MODERN industrial medicine is a highly specialized field of practice, largely concerned with maintaining a healthy environment for factory workers, and with properly placing these workers in jobs they are physically able to perform.

2. The advances of modern technology, reflected in the factory environment, have obliged the industrial physician to acquire and develop special methods in order to carry out his duties effectively.

3. By the very nature of things, there is no overlapping between this field and that of general practice, but cooperation between physicians in the two fields can be productive of good results.

Your Teeth and Your Job

JAMES M. DUNNING,
Lieutenant (DC) U.S.N.R.; Dental Director, Metropolitan Life Insurance Company, on leave of absence

MOST workers would readily admit that bad teeth might theoretically influence their working efficiency, but few probably realize the very definite harm which can be demonstrated from dental disease in large working groups, or realize the counter measures which can be taken to prevent such harm.

In the Brooklyn Navy Yard, a recent preliminary survey showed that

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dental absences over one day in length caused the loss of 16 work-days every day. Absences for a single day or part of a day were not included in this figure, nor were the long hours of discomfort and inefficiency endured by workers who decided to "stick it out" at their jobs in spite of toothache. Uncounted, too, were the stiff necks, strained eyes, bodily lassitudes, and many other disturbances caused by infected teeth that did not ache.

Effects such as these claim serious attention in war time the more so because most of them are preventable. Dental care is expensive. Yes, dental restorations are expensive, though the American public pays no more for them each year than for cosmetics. Large fillings, crowns, bridges, and dentures are difficult to construct, though if you need them they are the finest of investments. Far less expensive are the early phases of dentistry, most of them included under the terms "emergency care" and "prevention." These are as follows: dental examination, including x-rays; the removal of infected teeth (whether or not they ache at the moment); the filling of dangerous cavities even if only with temporary materials; the cleaning of teeth to prevent gum infections and pyorrhea, and the establishment of good toothbrush and dietary habits to cut down future cavities. These things come first. They should be well within the reach of every employed person in the New York area, but most people don't reach for them.

As an example of what a little help and stimulation will accomplish, let me cite the dental service of the Metropolitan Life Insurance Company, in operation now for more than 25 years. Here each employee is now examined once a year (formerly, twice a year). X-rays are taken where necessary. Dental cleansing is performed for those who desire it, and 85% do. Emergency care is given to relieve pain where "first aid" measures can be of help. Dental health education is given, stressing proper toothbrushing and diet. The employee is then referred to his or her private dentist for all real treatment procedures, or assisted to find outside care if not already in the hands of a dentist. The company pays for all of the preliminary work done in its own clinic, but for none of the real treatment. Treatment is *not* compulsory.

What has been the result of this program among the Metropolitan employees? They are a group of average income, mostly in clerical positions, yet they have taken better care of their teeth than the highest income group ($5000 family income, and over) reported a few years ago by the Committee on the Costs of Medical Care, as evidenced by the fact that they have received 1.7 times as many fillings per person per year. Emergency visits to the clinic for the relief of pain are made by less than one person out of every 10, during a given year.

The Metropolitan group when compared with the largest available nation-wide sample, shows, an average of five and a maximum of six teeth saved per person in the age groups between 30 and 60 years of age. It is easy to realize the added masticating efficiency, the better health and appearance, and the bridges and dentures not needed. Preventive care has avoided trouble, just as will good care for a car or for an electric refrigerator.

What is the lesson to be learned from this company's experience? Obviously company managements can stimulate great benefits for their workers through a simple "preventive" dental service. But the Metropolitan spends only about $6.00 per employee per year on these items of service, which their employees, or employees of any other concern, could obtain outside—if they only would. All definitive treatment has been paid for voluntarily by the employees themselves. The real lesson, therefore, is that every worker in the New York area should be able to achieve similar results if he would only plan systematic care for his teeth just as he would for his electric refrigerator or his car.

Ancillary Health Services in Industry

R. E. LANE,
Manchester

THE wisdom of providing medical services in industry is now generally recognized. The service may be regarded as being largely preventive and educational. The ancillary services with which this paper deals are subordinate to such a medical service, and differ from it in that they exist to provide individual treatment. There is this further difference that while there can be no substitute for an industrial medical service the treatment provided under the ancillary schemes can, for the most part, be obtained elsewhere; however, it is often not readily available, and for this reason is often neglected. The provision of these facilities in industry represents an attempt to overcome this difficulty. Even though it be admitted that existing provisions for treatment of dental, eye and foot conditions is inadequate, the case for asking industry to provide this treatment directly for its workpeople is not a good one; such treatment should, ideally, be readily available to all, and should, moreover, be used by every person who is in need of it. This is obviously envisaged in the recent white paper on a national health service. It is there admitted, however, that it will not be a practical proposition for a number of years. But we have in this country a long tradition of independent action by farsighted individuals, resulting in advances upon which have been built at a later date schemes of nation-wide application. It is not unreasonable, therefore, to expect certain progressive employers to provide these services. In fact, even before the outbreak of war, services of this type were not infrequently provided in industry.

In discussing any ancillary health service two vitally interested parties must be considered: the employer, who has to organize it and in part to pay for it, and the employee who is to use it. The employer may wish to justify his action on economic grounds, and though this may not be easy it should be possible in many cases. Other employers are less concerned with the economic aspect in its narrower interpretation, and are prompted by their sense of social responsibility to do all in their power to promote the health of their employees. The employee, on his part, demands that any services set up are efficient and scientifically sound.

A post-graduate lecture given at Manchester University: published in *British Journal of Industrial Medicine*, 1:4, 232-234, October, 1944.

Rules for Planning

THERE are a few simple and fundamental rules which should guide the planning of the three main ancillary health services — foot, eye and dental clinics—and it is the purpose of this paper to indicate briefly the lines along which such departments may be organized.

1. No scheme will succeed unless it has the support of the employees concerned. It is more important that the worker should retain his sense of independence and freedom than that he should have his corns or his teeth treated—though it is recognized that the comfort this treatment will bring may help to achieve an equanimity otherwise impossible. The service, therefore, must be optional.

2. The next essential is that the treatment provided should be of a high order. Well qualified men and women should be employed, and adequate equipment must be provided. Those appointed should be temperamentally suited to the work so that they will inspire confidence, and they must also be fully alive to the educational opportunities afforded them.

3. The service should not be provided free, but should be paid for, at least in part, by the workman. He should, however, be able to receive treatment in the employer's time, and should, if necessary, be allowed to pay for it by weekly deductions from wages, extending over a reasonable period. The services are thus made easily available and are officially encouraged by the firm.

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writer to 42 firms of varying size. In these firms three main services are in operation, foot, eye and dental; one firm has an ante-natal clinic;† and 31 of the firms use one or another form of physiotherapy—itself not a true ancillary service, but an essential adjunct to any factory clinic.‡

Foot Clinics

THIS service can be justified both in peace and war. In wartime the extra stresses, longer hours, poor shoes and the employment of a large number of people quite unused to long standing, render it particularly necessary. Even in peace-time inadequate facilities are provided for foot care, and there is an ignorance on the part of the working-class population of the relief to be gained from such treatment. Poor foot health frequently leads to faulty function, excessive fatigue, pain and discomfort. There can be no question therefore that chiropody takes a high priority among ancillary services.

Foot treatments are provided in the factory. Some cases may be referred to a doctor, but by no means all. Very little special equipment is required, so long as a small room is available for the chiropodist. This should be equipped with a stool and chair. It is essential that the chiropodist engaged should be a registered medical auxiliary. She should attend on a sessional basis and should provide her own instruments, but the material required (felt, strapping, etc.) should be provided by the factory.

During a session of two to three hours some 10-12 patients can be treated. Appointments should not exceed 10 minutes in duration, and if the service is to be self-supporting fees must be regulated accordingly. Experience, however, shows it to be wise to subsidize this service slightly. Foot clinics can well be provided by the small firm; one session per week is usually adequate for 1000 employees.

Ophthalmic Clinics

IT HAS been said that the care of the teeth of the nation is satisfactory when it is compared with that of the eyes. This is due to the scarcity of men specially trained for this work. The general practitioner is not competent to treat ocular defects unless he has some special training, and the medical profession has repeatedly and rightly opposed the attempt of opticians to secure state recognition. Despite this, however, a large proportion of the public choose to go direct to an optician when troubled by their eyes, and in view of the present scarcity of suitably trained oculists this is not surprising. We have then a working population in whom eye defects are common, with inadequate facilities for their treatment. It is recognized that the correction of defective vision frequently leads to better work, more work and less spoilt work. This is particularly noticeable in fine repetition processes and in precision work generally. Furthermore, the added comfort which follows such treatment is a matter of considerable importance to the worker, and results in less lost time and fewer accidents. There is an ample case, therefore, for the provision of an ophthalmic service in industry, both in peace and war, until such time as this is made on a national scale.

The method of choice is to secure the services of an ophthalmic surgeon who would visit the factory as occasion demanded. When he did so he would not only concern himself with refractions (six to eight cases per session) and eye injuries, but with the various visual problems, including lighting, upon which the industrial medical officer may wish to secure his views. These visits will probably consist of a session of about two hours, paid for, at an agreed rate, by the employer. Glasses may be obtained through a visiting dispensing optician, or one chosen by the patient. Grants for glasses can be obtained through approved societies, and a similar arrangement regarding payment from wages can be made, as with the dental scheme. Alternatively the National Eye Service can be brought before the notice of the workers, and facilities granted for appointments during working hours. This scheme can be applied to the smallest factory. A third and less satisfactory method provides for sight testing to be done by an optician, usually through the approved society, but this is not satisfactory. National Health Insurance fees are charged and the employer is called upon to pay nothing. This, of course, is no more than a glasses service, and is inferior to the previous schemes. When such a service is installed the optician should be paid a standing fee, and should not have to depend for his remuneration upon the sale of glasses. With this safeguard it can be made into a useful makeshift while shortage of medical personnel persists.

Dental Service

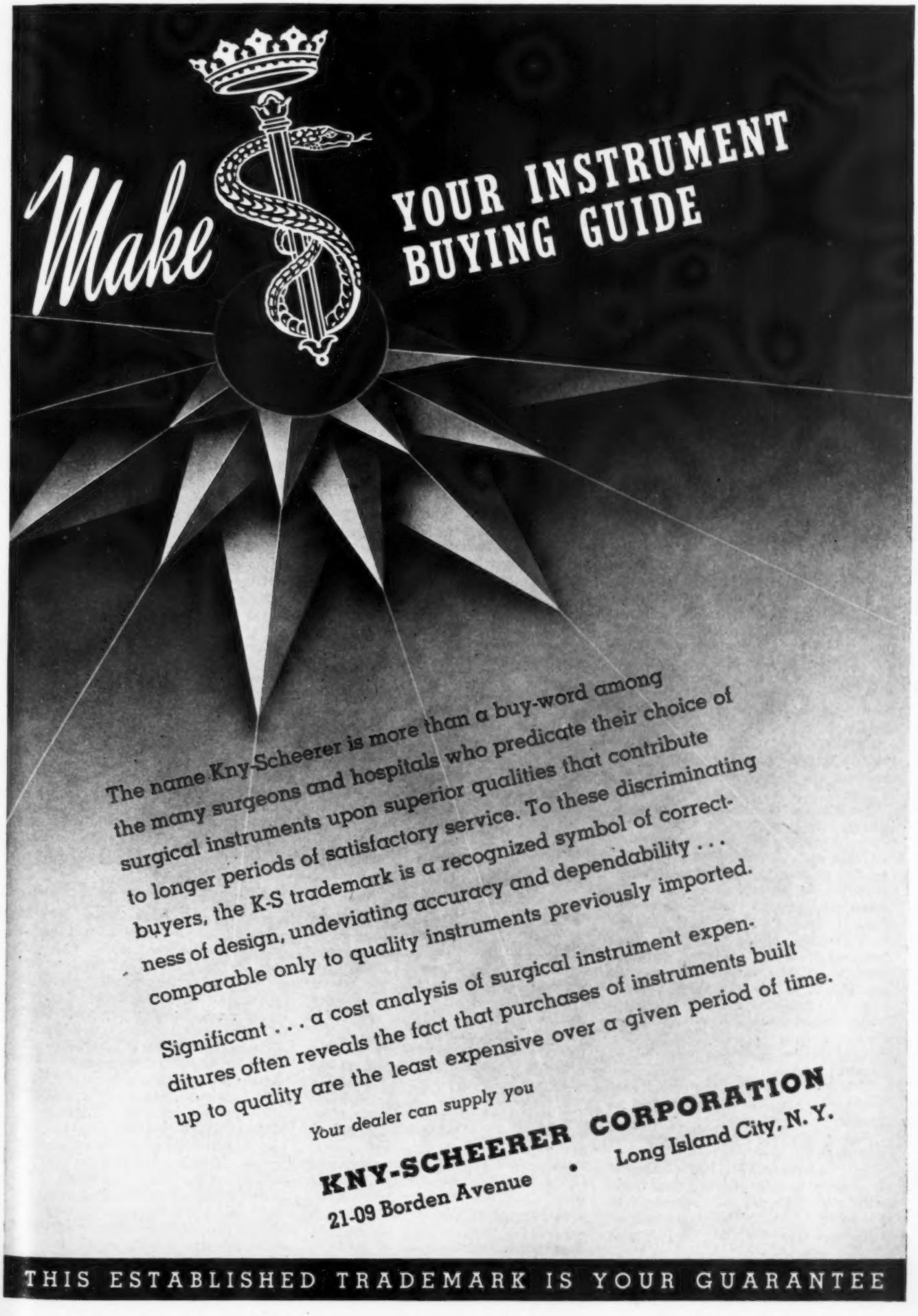
THE provision of a dental service in industry raises several difficult problems. In 1921 dental benefit first became available under the National Health Insurance scheme. In 1922 the British Dental Association urged the extension of dental facilities in industry. In 1937, however, it changed its policy and recommended "that it is no longer necessary or desirable to advise employers to establish dental treatment centres, other than for the purpose of treatment of emergency cases and inspection," since it was felt that "any considerable extension of the system of factory clinics would place the ultimate control of the dental treatment of every worker in the hands of the big employers of labour." It further maintained that rapid progress had been made in recent years towards the provision of adequate dental treatment for the industrial population. While there is something to be said for the present policy of the B.D.A., particularly in the provision of advisory clinics, the suggestion that adequate treatment is available, for the industrial population, cannot be maintained. In 1939 there were 18 million insured persons in the country, and of these 13 million were eligible for dental benefit (81% men, and 63% women). Only 6% applied for benefit, and 80% of the funds available were spent on extractions and the provision of dentures, because by the time application was made that was the only treatment of any avail.

Such are the conditions among the adult insured persons, but adolescents between 14 and 18½ are not eligible for dental benefit. Moreover, this group forms a small but important section of the industrial population. It is submitted, therefore, that the dental care available for the industrial worker is not adequate. Though this be accepted, however, there seems no reason to suggest that it is the duty of the employer to make good the deficiency.

There can be little doubt that general health is closely related to masticatory efficiency and freedom from disease of the teeth and gums, so that in any comprehensive health service the development of a national dental service should proceed side by side with that of the medical service. The white paper on health services, in outlining this eventual development, states that "there must be delay in reaching a stage at which general dental and ophthalmic services can be provided. . . ." In view of the shortage of dentists, and, more serious, the shortage of training schools for them, there is no doubt that many years must elapse before this ideal is fully realized. This waiting period, however, may with advantage be used for experiment, and it is well that the place and value of the dental clinic in industry should be thoroughly tested. It is possible that dentists employed

†Ante-natal services have no place in industry in peace-time. In wartime, however, it is a convenience both to mother and to employer to have an ante-natal clinic readily accessible at the place of work; ante-natal advice is more likely to be sought, and considerable working time may be saved. It is also of value in enabling modifications of hours and job to be made for the expectant mother; and also for making certain that she obtains the additional foods to which she is entitled. The service can only be instituted in large firms employing many women. It must be closely linked with public health authorities and the general practitioner, and should be approved by the local Medical Officer of Health. Such a service has been described by O'Sullivan and Bourne (1944).

‡Physiotherapy is the most frequently installed of the "ancillary services," although wrongly so called. It is, in fact, such an essential part of equipment that it cannot be regarded as coming within the scope of this paper. Infra-red equipment is useful in a factory clinic in the treatment of strains and sprains, fibrositis and similar affections, and septic conditions, and the provision of facilities for giving this treatment in the works save a great deal of time lost by visiting hospital. Ultra-violet light is the most widely provided "ancillary service" in industry, though its value in the prevention or treatment of disease in adults is not established. Further installations in industry are therefore better avoided until its value has been proved by a scientific body of repute.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by an outside authority might eventually be located in a factory, just as at the present time teachers, paid by the education authority, are working in schools for "young persons," situated within the factory.

The white paper suggests that in view of the shortage of trained personnel priority should be given to certain sections of the community, and adolescents are specially mentioned as being one of them. Industrialists employing large numbers of juveniles may well consider that they have a social responsibility towards them and be prepared to help them to obtain dental treatment. The part to be played by the employer may vary from the provision of a clinic in the works to the granting of permission for treatment to be sought in works' time. The excellent results that have attended the Cambridge scheme, whereby dental treatment provided by the local authority has been made available to young people in industry, are very encouraging (Grandison, 1944). There young people are followed up after leaving school at 14, and are given an appointment at the dental clinic every six months, until they reach the age of 18. This treatment is given during working hours, and local employers have, without exception, cooperated by granting time off for these young people to keep their appointment. Extension of similar facilities to other areas would be welcome. The part of the employer here is not an onerous one, and there must surely be few who would refuse to cooperate in such a scheme. Reform in our educational system will doubtless eventually bridge the gap between the years of 14 and 18½, but until the whole of this important period is catered for, the adolescent can best be approached through his employer.

In general the position may be summed up thus:

1. In wartime it is not justifiable to start up a full dental clinic in industry, unless the factory is isolated, or juveniles predominate, though an emergency service may be desirable.

2. In time of peace it will probably be a wise and welcome provision, particularly if there is a large juvenile section. If the labour turnover is small, and if juveniles are retained with the firm on reaching the adult state, definite benefits accrue to the employer.

The service provided may be of varying types:

(*a*) Full or part-time dental surgeon who undertakes all types of treatment for employees.

(*b*) Emergency treatment and advice only.

(*c*) Extension of National Health Insurance benefits to all employees, with arrangements for payments to be made by deduction from wages, with free treatment for all juveniles (under 18).

(*d*) Arrangements for juveniles to receive dental treatment in works' time.

In the full service, prophylactic, conservative and prosthetic treatment is offered. Stress is placed on the retention of teeth and education must be regarded as one of the most important functions of the service. Education of the worker should not be confined to his own personal requirements, but should emphasize his responsibility for the dental health of his children.

It has been suggested that in industry the dental service is not part of the industrial health service, and there are several instances in which a dental surgeon carries on a practice in the works, or among a section of the employees, and remains quite independent of any general health policy. This is a mistake. In industry the dental service is a true ancillary health service, and while the dentist is naturally left to decide all details of treatment and retains control of his department, the industrial medical officer must be consulted on matters of broad policy, and the dental surgeon should be administratively responsible to him. It is estimated that in a general factory of 5000 workers a whole-time dentist is required, whereas this total may be as low as 3000 if there is a special hazard, such as lead or phosphorus (Baron, 1944). Wherever possible the dental surgery should be in the works, situated centrally.

The small factory raises special problems. In this case inspections may be carried out on the site while operative work is done at an outside surgery, or arrangements can be made with a nearby dentist to set aside certain times for employees. The grouping of small industries might be considered, but experience shows that this is rarely satisfactory. It has been suggested that a mobile dental surgery sent out by the local dental hospital might have possibilities and that the experiment should be tried out, but experience with this method in rural districts for the school dental service would throw some doubt on its efficiency.

Conclusions:

IT IS important that the opportunities for constructive health work offered in industry should be more widely realized. Here people are gathered together in groups, and it is here that health education can best be attempted. This should go on persistently and unobtrusively. Ancillary health services offer great scope for practical education of this type, and in this way can play an important part in promoting the health of the community.

In dealing with ancillary health services, as with all industrial welfare activities, we must retain a sense of proportion. It is no good providing the most comprehensive schemes if the basic relationship between employer and employee is wrong. Nor are these services likely to be of much avail unless the worker is well fed and well housed. These are the big things, and let no one install any or all of these ancillary schemes if it is likely to act as an excuse for the neglect of these major matters.

References:

BARON R. (1944). *Brit. Dental J.*, *76*:331.

Dental Services in Industry (1942). Industrial Welfare Society, London.

GRANDISON, W. B. (1944). Personal communication.

O'SULLIVAN J. V., and BOURNE, L. B., (1944). *Brit. Med. J.*, *1*, 108.

The Improvement in Nutrition as Protection against Industrial Toxicity

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THE subject of the increase or decrease of industrial poisonings as related to nutritional deficiency in industry is a field that has been, shall we say, negected. It is a very fertile field for investigation and one which in the future is likely to achieve a status of vast importance.

Obviously, in any program dealing with this subject, protection of the worker, two methods of approach are essential. The first is the suitable installation of ventilation for removing such materials as dust, fumes, and vapors. This is generally accomplished by safety departments, and today a rather remarkable job has been done considering the tremendously increased number of individuals exposed to various toxic substances. Acute cases of poisoning in industry are relatively rare. When they do occur, it is generally a function of carelessness on the part of the operator himself, oversight on the part of the supervisor or some person of like authority, or in times like these when we are subject to conditions which are not normal, a combination of these circumstances may be responsible for accidental exposure of personnel to dangerous substances.

The recent incident that occurred in a Kentucky parachute plant where 137 workers suddenly evidenced a rather marked and acute response to carbon tetrachloride may be cited. It was discovered that open bowls of the material had been left standing on the work tables for the purpose of cleaning oil from the nylon materials from which the chutes were made. Because of the fuel shortage and necessary conservation of heat, ventilation was reduced; the result was obvious and

From "New Steps in Public Health," Twenty-Second Annual Conference of the Milbank Memorial Fund, April 12-13, 1944.

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dramatic. One hundred and thirty-seven workers presented gastro-intestinal complaints. As soon as the cause was determined, the solvent was at once changed to a more innocuous one, notably warm water and soap.

Aside from such infrequent occurrence, however, the majority of industrial poisoning cases are of the chronic type and only a certain portion of employees are affected. It is in this group, wherein susceptibility plays such an important role, that the field of investigation should now be concentrated.

Human experience and animal experimentation have established the fact that susceptibility to any toxic substance varies tremendously between the species and even in given members of the same species. This variation is rather the rule and not the exception.

It has also been demonstrated that man, in general, is more susceptible to almost any toxic substance than any given type of animal. Public health studies in various occupations by industrial physicians and other industrial personnel indicate that individual resistance to poisoning varies quite widely, with age, sex, physical type, and, of course, general health. Perhaps if there is such a thing, the one common denominator is the nutritional status of the employee.

The importance of adequate and well-balanced nutrition on maximum work production, mental and physical alertness, nervous equilibrium, and general well-being, is becoming recognized, but it is only lately that it has become prominent. Its bearing on resistance to toxic environment has not yet been sufficiently investigated and certain deductions must be made largely by analogy. For example, it is well known that general undernourishment or a deficiency of some vital element of nutrition increases fatigue, and it certainly increases the susceptibility to infection. I do not feel that it is a long jump from this demonstrated fact to the assumption that such nutritional deficiencies increase susceptibility to toxic exposures.

This deduction has a certain amount of scientific background in animal experimentation and certain empirical evidence has been found in human beings. In many instances some particular element of nutrition has been shown to have a specific effect on the action of toxic substances, either increasing or decreasing their action within the body. This is exemplified by the various experiments, the results of which you have seen, dealing with the addition of casein and riboflavin to the diets of rats. I have in mind a very dramatic experiment wherein the addition of these elements to the diet had a profound protective effect against the carcinogenic action of certain of the dye products, the dimethylaminoazobenzene and other nitro compounds, which have produced, experimentally, tumors of the liver.

High-fat diets in vitamin C deficiency are known to lower the efficiency of the liver too, and to render individuals suffering from such a complaint much more susceptible to such poisons as trinitrotoluene, which seem to have a specific effect on the liver. Certain other poisonous substances which are encountered in industry, notably benzol, a widely used compound, act more or less on the blood by destroying the red cells, and the effects are very dangerously increased in individuals who show some evidence of anemia. This certainly is a function of nutrition in many instances.

Diets low in protein, and a lack of iron, generally speaking, are essentially inadequate in maintaining the normal blood constituents. This is particularly important in those individuals who in industry are being depended on to do a specific job and do it well.

Although the study of diet with relation to industrial poisoning is certainly in its infancy, there are a number of reports in the literature which show the effective use of food, both experimentally and clinically, in the prophylaxis as well as the treatment of poisoning.

More than a decade ago, Lamson[1] and his co-workers found that dogs fed on normal diets tolerated well very large doses of carbon tetrachloride. When the calcium content was reduced by withholding bones from the diet, the dogs developed in a relatively short time tetanic convulsions, gastrointestinal distress, hemorrhages, vomiting, retention of urine. Upon restoration of bones or calcium in some other form to the diet, these symptoms disappeared, and carbon tetrachloride in the previously administered dosage was tolerated quite well by these animals.

Similar symptoms, unquestionably, develop in humans. Consequently, the dietary regime for industrial persons who might be exposed to compounds such as carbon tetrachloride by inhalation of the fumes should have their diet rather well supervised.

In the Kentucky incident that I mentioned a moment ago, blood serum estimations on 16 of the patients with symptoms of poisoning showed that in 50%, or eight of these individuals, the serum calcium was well below the normal. The attending physicians recommended that the persons unavoidably exposed to such a compound be given a quart of milk a day in addition to their regular diet to increase their blood calcium level. They were also asked to avoid greasy foods, oily laxatives, and particularly to avoid alcohol, which apparently increases the toxicity of carbon tetrachloride and such substances.

Calcium is also a very important factor in poisoning from hydrofluoric acid. This substance is encountered in various industries, such as bleaching, dyeing, brewing, the manufacture of insecticides and in the finishing of decorative glass. When hydrofluoric acid vapor or fluorine gas, is inhaled, it acts more or less as a protoplasmic poison and also interferes with the normal metabolism of calcium. The most common clinical symptom resulting from calcium deficiency is, again, tetany; death has resulted from massive exposures. Chronic symptoms are loss of appetite, anemia, eczema, conjunctivitis, muscular cramps, and in individuals and animals exposed to moderate quantities over long periods of time, a change in skeletal structure resembling a type of osteosclerosis or exostosis.

In this country to date, we have had no outstanding examples of fluorine exposure and subsequent exostosis, but in cattle that have grazed continually through a good portion of their life span in the vicinity of a foundry where the flux used contained a large amount of cryolite, x-ray examination revealed a porous structure of the mandible. This was due to the amount of the material ingested with their grazing food.

Treatment of this type of poisoning or prophylaxis where exposure is inevitable, certainly should include the dietary intake of extra calcium in the form of milk or calcium lactate by mouth. Dietary calcium also plays a rather important role in lead poisoning. Lead enters the system chiefly by way of nose and throat, by inhalation, where it is absorbed from the lung in the circulating blood. It has an injurious effect on the capillaries, red blood cells, and nerve tissue. Eventually much of this circulating lead becomes stored in the long bones in the form of tertiary lead phosphate, where it does relatively little damage. The remainder is excreted by the kidneys. The storage and excretion of lead appear to be controlled by the calcium metabolism. If the patient's diet has a high calcium content, lead is deposited in the bones, immobilized, so to speak.

In cases where some systemic change causes a demobilization of lead and its return to the circulating blood, acute poisoning symptoms appear. Some things which might affect the mobilization of lead are administration of thyroid extract, low calcium diet, acute infection, or anything having a tendency to promote acidosis.

In the treatment of acute lead poisoning the administration of calcium intravenously and orally is essential and chronic cases should be placed on a diet rich in calcium and given about 60 grains of calcium lactate daily by mouth. Nutritional prophylactic treatment for workers exposed to lead, even at its irreducible minimum concentration, is essentially the same as that for preventing rickets; that is, a quart of milk daily, a tablespoonful of cod liver oil or vitamin D in some other form. This regimen is usually sufficient to maintain a calcium balance that is definitely positive and reduces the appearance of this condition markedly. Milk, as a matter of fact, I think can be used most efficaciously in any industry wherein

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heavy metals are extensively employed and where small particles of these heavy metals might be accidentally deposited in the nose and throat and subsequently swallowed.

Investigators have advocated the administration of vitamin C in lead poisoning. Now it is true that vitamin C inactivates lead more or less by formation of an ionizable lead ascorbate salt or complex of such a salt in the test-tube. Unfortunately, extensive controlled clinical experiments do not bear this out.

Nickel poisoning is an entity which is being seen now a little more than previously because of the wider use of nickel carbonyl, which is sufficiently volatile to be inhaled. Nickel poisoning causes degeneration of the heart, the liver, the kidneys and treatment includes forced elimination through the bowels and kidneys, and placing the patient on a low-fat diet. Although no reference has been found in the literature on the prophylactic use of a low-fat diet in workers exposed to nickel, such a procedure seems to be indicated and is one which might be used very effectively.

Benzol and its compounds are very important sources of poisoning. Their fat-solvent properties permit a very rapid penetration into the blood stream and subsequent concentration in the bone marrow and the brain, with destruction of the red cells, of course, in the bone marrow where they are manufactured.

The blood picture in the early stages of benzol poisoning shows anemia, leukopenia, thrombopenia, and diminished clot retraction. Clinical symptoms include nausea, vomiting, headache, dizziness, weakness, and hemorrhages from the mucous membranes, or into the skin in the form of purpura. Women appear to be much more suspectible than men and, if pregnant, exposure to benzol tends to promote abortion. According to Seyfried,[2] nutritional deficiencies, especially in vitamin C and riboflavin, and obesity, cause greater susceptibility to the aromatic hydrocarbons. Administration of vitamin C is said to corerct the hemorrhagic tendency. Moreover experiments on guinea pigs conducted by Demole,[3] of Basle, have shown that chronic benzol poisoning inhibits the normal storage of vitamin C in the adrenal glands and the liver and increases the vitamin C requirement. Meyer[4] has observed a deficiency of vitamin C approaching scorbutic levels in human cases of benzol poisoning. Hence, a greatly increased dietary intake of ascorbic acid by exposed workers might be useful as a prophylactic measure. Other nutritional factors found beneficial are liver, iron, calcium, lactoflavin in the form of whole milk, and yeast.

Among workers in nitrobenzol and other nitro compounds of the benzol homologues, poisoning results from inhalation of the vapors and absorption of these compounds through the skin. These chemicals act chiefly by causing a type of decomposition of the red blood cells and formation of methemoglobin which produces a secondary anemia similar to that seen in carbon monoxide poisoning, or intoxication. Exposed workers should by all means avoid fats, milk, and especially alcohol, all of which increase the absorption of the toxin into the tissues.

Poisoning by TNT, popularly manufactured in practically every section, constitutes a very large hazard and appears to be influenced somewhat by diet. Experiments with rats have shown that severe symptoms and pathologic lesions result from this substance when the animals are given a ration high in fat, whereas the effect of the exposure to TNT was decreased by very high carbohydrate rations and was found to be almost nil in high protein diets. A reduction of hemoglobin in the blood and fatty infiltration and necrosis of the liver are among the severe effects produced on a diet with a high fat content.

The effects of trinitrotoluene poisoning are very similar to this in man. This is borne out by an examination of Finnish munition workers, reported by Noro[5] who showed that the blood levels of vitamin C in about half of the cases of TNT poisoning were notably low. He recommended a treatment which included a high-carbohydrate, low-fat diet, with additional protein and vitamin C and B complex.

In 1942, Dr. Foulger[6] studied the prophylactic effect of administration of 100 mg. of vitamin C daily to workers exposed to TNT. He found indications of a beneficial effect of this type of treatment.

The much higher incidence of this form of poisoning reported among munition workers in England may be due in part to the notoriously poor diet of the English working man since the outbreak of the war. British investigators have suggested the use of a diet augmented with protein as a prophylactic measure in workmen under this exposure, but no reports as to the effect of this type of regime have as yet become available.

There is a certain relationship between exposure to carbon bisulfide and vitamin B_1. It has been demonstrated by Lewey, who found a remarkably diminished urinary excretion of thiamine in viscose rayon workers who were chronically exposed to carbon bisulfide vapor. Chronic poisoning may affect all parts of the nervous system, both central and peripheral. These effects may be due to thiamine deficiency resulting from liver damage and also to direct poisoning of the coenzymes of nerve metabolism and of respiration.

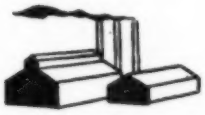
At any event, treatment with massive doses of vitamin B_1 rapidly improved the peripheral nervous symptoms and Lewey recommends meals very rich in vitamin B be provided by cafeterias of plants using carbon bisulfide, and the same advice might well be extended to plants using other industrial solvents, almost all of which have a damaging effect on the central nervous system.

Another compound, tetrachlorethane, an organic solvent used almost universally, and particularly in connection with war production, is responsible for a large amount of the industrial toxicity that is seen. Inhalation of its vapors and absorption through the skin may cause severe symptoms and one fatal case has been reported as a result of direct contact with the substance. The predominating symptoms may be related either to the nervous system or to the gastro-intestinal tract. Common manifestations of the nervous form are abnormal perspiration, twitching of the facial muscles, disturbances of the motor and sensory reflexes, particularly in the extremities. The chief effects on the gastro-intestinal tract are anorexia, vomiting, nausea, jaundice, a hemorrhagic tendency, and in some cases the appearance of acites. In six non-fatal cases reported by Coyer[7] in 1944, treatment included the administration of vitamin K, injections of liver extract and glucose, and a high carbohydrate diet. Alkaline drinks and fruit juices were given freely. The treatment seemed to be very efficacious.

Wilson and Brumley[8] observed 25 cases of intoxication in varying degrees, among 1,000 persons exposed to tetrachlorethane. The substance appeared to act directly on the liver rather than on the blood cells, and the icterus index is now believed to be the earliest method of detecting this type of intoxication. Persons in the older age groups, obese individuals, and the colored were found to be especially susceptible to this form of poisoning. A high-fat diet appeared to be a very prominent factor in susceptibility. The authors recommended the distribution to exposed workers of printed diet instruction lists, recommending a reduction of fat consumption with an increase of carbohydrates, proteins, and vitamins, and the avoidance in all instances of alcohol. The cases reported were treated with intravenous glucose, liver, and iron for the anemia, and multiple vitamin capsules, and they did well.

Selenium is a compound which is beginning to come to the front now as an offender. It has been rather widely studied in South Dakota, where this substance is present in the soil and consequently present in substances grown in the soil in such abundance as to render it toxic to animals and to some extent to human beings. Selenium poisoning may constitute an industrial risk in the refining of copper, lead, zinc, in which the substance is often present, and also in the roasting of pyrites and the making of lime and cement. Compounds of selenium are used in the manufacture of glass and ceramics, vulcanization of rubber, and various other processes. The substance is also an essential element in the making of the photo-electric cell.

Selenium poisoning has been investigated chiefly in animals. The most

In the first-aid stations and medical departments of large  and small industrial plants, 'B·F·I' has become a "must"--for it is so convenient, handy and ready for immediate use in the treatment of cuts, abrasions, burns, chafing, scratches and other minor wounds and skin irritations. Dusted on liberally, 'B·F·I' brings almost immediate relief to tired, burning, weary feet, and is of proven value in the treatment of epidermophytosis (athlete's foot). It promotes healing without caking or forming hard crusts--an ideal antiseptic, dry, surgical dressing. 'B·F·I' Powder is supplied for "industrial use" in a ½ pound combination sprinkler-top and dispensing package. Also available in ¼ ounce and 1¼ ounce sprinkler-top packages.

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constant symptom is a progressive anemia with degenerative changes in the liver. Feeding experiments in rats have been made to determine the relationship of diet to the severity of symptoms. Vitamins A, D, and the B complex were found to have no beneficial effect; crystalline vitamin B_1, as a matter of fact, greatly intensified the symptoms in every case. Cystine, likewise, proved to be ineffective. Rations containing a high protein content have produced the best prophylactic results. From various reports, it would appear that the proteins of casein are the most beneficial. It has lately become apparent that the addition of the amino acid, methionine, to a diet low in calcium has an equally favorable effect and is one that should be borne in mind.

It has been pointed out by Reed and Harcourt[9] that most of the soluble selenium compounds are capable of producing acute and chronic symptoms in man, either through inhalation, skin absorption, or by way of the gastro-intestinal tract. Whatever may be the mode of entry, they give rise to gastro-intestinal symptoms, irritation of the nose and throat, and a metallic taste. The diagnosis of selenium poisoning in all instances may be confirmed by the finding of this compound in the urine. A high-protein diet is urgently recommended in the treatment, and while, again, I have seen no reports of its use as a prophylactic among the industrial personnel, such a diet, preferably rich in casein, certainly appears to be indicated.

Rösing[10] has reported the beneficial effects of a general improvement in nutrition among arc welders in Germany. After a study of the high incidence of gastro-intestinal disorders at the Krupp Works, he concluded that the causative factor was the inhalation of metallic fumes in the process of welding, an entity which we are becoming acquainted with in this country. Such exposures in confined spaces, when the workers refuse to wear protective masks, give rise to the symptom complex of acute gastric pain, nausea, and vomiting known as "fume fever."

In the prophylaxis of this condition, the importance of a good diet is stressed. Warmed-up food, poor in vitamins, cold drinks, the excessive use of tobacco and alcohol, all contribute and were considered as one of the prime conditioning factors. In some industries welders have been given soup, gruel, or milk, during working hours, with excellent results.

The need for improvement of diet among industrial workers as a whole has been demonstrated sufficiently in numerous surveys and studies both by groups and individuals, and I have particular reference to the work done by Dr. Borsook, Dr. Alpert, and Dr. Keighley[11] among the aircraft workers in Southern California, and by Dr. Goodhart, who has done so much work among the industrial personnel in the East. With such data as we have in mind from these sources, it is hoped that further attention may be directed toward the nutritional needs of employees in those industries which present such specific and special hazards. I think that it is fairly obvious that certain of these conditions may be greatly ameliorated by protective diets, designed in accordance with specific needs for these compounds. It is becoming very increasingly apparent that the approach and solution to this problem can only be done through groups, or a group such as your own, and industry has become dependent on you.

Too many of the larger industries in this country are not sufficiently aware of the hazards or are not willing to allocate funds to maintain a laboratory or department with facilities for studying the nutritional status of the personnel. Therefore, it obtains that this, at the moment, is about the most fertile field that I can think of for scientific research, particularly with a view to mass improvement of a vital and necessary sort.

References

1. Lamson, P. D.: Monot, A. S.: and Robbins, B. H.: The Prevention and Treatment of Carbon Tetrachloride Intoxication. *J.A.M.A.*, February 4, 1928, 90, pp. 345-349.
2. Seyfried, H.: Zur pathogenese und Theropie beruflich erworbener Schäden und Beschwerden durch chronische Einwirkung von Benzolkörpern. (Pathogenesis and Therapy of Injuries and Symptoms due to Chronic Effects of the Benzol Group.) *Archiv fur Gewerbepathologie und Gewerbehygiene*, December 31, 1942, 11, pp. 588-618. (Abstract, *Bulletin of Hygiene*, October, 1943, 18, pp. 841-843.)
3. Demole, V.: (Cited by Meyer.)
4. Meyer, A.: Benzene Poisoning. *J.A.M.A.*, March 13, 1937, 108, p. 911.
5. Noro, L.: Untersuchungen ueber die Trotyl-Tetryl- und Knall-quecksilbervergiftungen bei den Arbeitern der Munitions—fabriken Finnlands. (Poisoning by T.N.T., Tetryl, and Fulminate of Mercury in Finnish Munitions Workers.) *Acta Medica Scandinavica*, 1941, Supplement 120, 95 pp. (Abstract, *Bulletin of Hygiene*, March, 1943, 18, pp. 223-224.)
6. Foulger J. H.: Prevention of Ill Health in Industry. *Medical Clinics, N. A.*, May 15, 1942, 26, pp. 1145-1161.
7. Coyer, H. A.: Tetrachlorethane Poisoning: Seven Cases: Review of Several Treated. Industrial Medicine, March, 1944, 13, pp. 230-233.
8. Wilson, R. H. and Brumley, D. R.: Health Hazards in the Use of Tetrachlorethane. Industrial Medicine, March, 1944, 13, pp. 233-234.
9. Reed, J. V. and Harcourt, A. K.: The Essentials of Occupational Diseases. Springfield and Baltimore, Charles C. Thomas, 1941.
10. Rösing: Häufigkeit und Ursache von Magenbeschwerden bei Elektro- und Autogenschweissern. (Frequency and Cause of Gastro-Intestinal Symptoms Among Welders.) *Archiv fur Gewerbepathologie und Gewerbehygiene*, October 10, 1941, 11, pp. 77-88. (Abstract, *Bulletin of Hygiene*, July, 1942, 17, pp. 452-454.)
11. Borsook Henry: Alpert, Elmer: and Keighley, G. L.: Nutritional Status of Aircraft Workers in Southern California. The Milbank Memorial Fund *Quarterly*, April, 1943, xxi, No. 2, pp. 115-157.

Industrial Medicine

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As has been emphasized on other occasions, war is a great educator. The process is expensive and painful, but the lessons are conducted on a large scale with correspondingly large and often beneficial results. Medicine is a conspicuous example of the benefits resulting from war, if such an expression is permissible, and industrial medicine no less than other branches of medicine.

The war effort immediately threw the spotlight on industrial medicine and hygiene. The mechanization of war to its present extraordinary degree made industrial activity, both manufacturing and processing, the bedrock of military action; and three-shift, around-the-clock production in mine, factory, or transportation system can not be maintained without medical supervision of the worker and of his environment.

Industry found that out in World War I and in the intervening years industrial medicine began to come into its own. It became respectable, blossomed out into a definite branch of the medical art, was recognized by the American Medical Association, and the state and county societies, so that when World War II came along there was a pretty good idea among those responsible, of what needed to be done to make possible the productive effort so essential to an all-out war basis.

Industrial medicine is concerned primarily with two activities, supervision of the worker and supervision of his industrial environment.

Medical supervision of the worker implies a selection for the job on a physical basis; it has little or nothing in common with military selection which is based on all-around physical fitness.

The number of applicants who cannot be put to work on account of physical imperfection is exceedingly small and comprises those who actually are unable to work or whose employment would constitute a menace to themselves or their fellow workers. Active tuberculosis is an example. The number of applicants for industrial jobs whose physical condition is such that they must be restricted to certain types of work is much larger, and the return of battle casualties will increase them. This problem is not new and industry has been facing it intelligently and constructively for years. Two considerations usually are to be reckoned with, recognition of the limitations of the individual resulting from his particular imperfection, and protection of fellow employees from risk arising from the same cause. Here are involved matters of medical judgment of the first importance, which must be based not only on an appraisal of the individual but also of the job he is to do.

Read before the Kentucky State Medical Association, Lexington, September 19, 1944; published in *Kentucky Med. J.*, February, 1945.

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It is not sufficiently appreciated that when a physician tells an applicant that he is not fit for work or fit only for limited work, he is performing a professional act of a grave and serious nature. The doctor has that man's economic future in his hands and the responsibility is one not to be carried out perfunctorily.

The supervision of environmental conditions with respect to work places is largely an engineering activity but one that cannot be separated from medical participation if results are to be adequate and properly oriented. Illumination, ventilation and the control of dusts, fumes, gases and exposure to toxic materials are all involved. Not infrequently the existence of a toxic exposure is first made evident by the physician's report on an employee. The industrial physician need not be an engineer or a toxicologist, but he should know the basic requirements with respect to illumination and ventilation and he should know what toxic materials and processes are present in the plant he serves and he should be able to recognize the clinical evidences of harm resulting from such exposure.

Industrial medicine is largely preventive medicine. Based originally on the need of caring for accidental injuries and the follow-through on compensation cases, industrial medicine today has gone far beyond this original concept. The adaptation of the man to the job implies a continuing process beginning when the man is hired. His physical condition may change and his job may change. Workers in certain chemical and hazardous exposures may need weekly or monthly supervision which may involve special examinations, including x-ray and laboratory procedures. Many persons who are physically handicapped either by disease or deformity are capable of excellent and useful work, if, and only if, they receive proper medical supervision.

Industrial medicine as we have so far discussed, is a responsibility of the employer. He must provide emergency medical service in the plant, provide healthful working conditions and protect employees from toxic exposures incident to the business. In recent years other phases of industrial medical service are being developed to meet existing needs for which the employer is not primarily responsible, but which concern both employer and employee to a very great extent indeed.

True occupational diseases which occur as a result of working conditions are fairly well known and their methods of detection depend on recognized clinical procedures. In the war industries involving exposure to explosives and chemical warfare agents, occupational diseases are a grave responsibility. In industry in general, occupational diseases are associated with recognized types of work, and while highly important in some industries, in the main they account for a very small amount of disability.

It is quite another matter with respect to the non-occupational illness of industrial workers. The responsibility of industry may be very small, but the sum total of time and wages lost through illness among industrial workers is enormous. This loss affects industry and the worker alike, much of it is preventable and can be attacked through the industrial approach. Consequently, industry has a real interest in a medical service which can reduce this wastage.

True occupational disease causes an average loss of time among industrial workers of a fraction of a day per year and most, if not all, receive compensation benefits. Sickness of all sorts among industrial workers caused, in pre-war days, an average lost time of eight days per year for men and 12 days for women.

Much of this lost time is in one, two, and three-day illnesses which receive no benefit of any kind and are a sheer loss, both in wages and production hours, to the industry and the worker. There is a growing feeling, both among employers and workers, that something can and should be done about this and there is already evidence that if skillfully attacked with adequate professional service and equipment, marked reductions can be effected. Excluding the military services, the application of public health methods and the principles of preventive medicine nowhere has a better and more promising field than in industry.

INDUSTRIAL medicine is far from static. New methods and inventions affect manufacturing procedures; new chemicals and chemical combinations imply new problems in toxicology and control; the reaction of war and altered economic conditions must affect industrial medicine as well as medicine in general. Also, there is an aroused interest on the part of labor which is demanding medical care on a basis beyond and independent of the operation of compensation laws, or the primary responsibility of the employer.

You may say "How does this affect the average physician?" and the answer is that the physicians who practice in or near industrial communities can not but be affected by the developments in industrial practice which are making themselves more and more evident.

It is necessary, in order to avoid confusion, to keep clearly in mind what are the responsibilities involved.

The employer is responsible for the care of injuries and illnesses resulting from employment. He also usually assumes the emergency care of illnesses or painful symptoms occurring during working hours. This is a matter of mutual advantage, the workman gets prompt and skillful treatment and can usually return to work instead of having to leave his work. Also the industrial medical department may conduct programs of health education, nutrition, dental hygiene and athletics and most well organized industrial medical departments have some of this type of activity.

The employer is not legally responsible for providing hospitalization or sick benefits, outside of the compensation law, though to an increasing extent he is joining with his employees to obtain for them such advantages on a cooperative basis.

The physicians who administer industrial medical departments may be full-time, or part-time, and not infrequently a combination of both will be found in the same establishment.

Industrial medical service has kept pace with the advance of medicine in general. At the beginning of this war, the Surgeon General's Office commissioned in the Army Medical Corps a number of industrial physicians, mostly men who had held full-time positions. We are impressed with the fact that these young doctors are keen, alert, thoroughly grounded in modern medicine, and good administrators. The present day industrial physician can hold his own in any company.

There are many industrial installations where the standard of diagnosis is of the best order and will compare favorably with any in this country. One result of this is that it has given workmen a growing appreciation of what good medical service is and what it can do. Consequently, one need not be surprised if the workman has manifested an interest in the possibility of procuring medical service for his family commensurate with and on a basis comparable to, the medical service in his place of employment.

At the annual session of the American Medical Association last June, in the Preventive Medicine Section, there was a panel discussion on variations in industrial medical service plans, presented by six physicians. It is probable that this discussion will be published and it deserves your careful consideration. *These six plans are in operation today. They represent not only an accomplishment but also a trend. They vary in scope and content and present certain definite advantages. They are acceptable to the physicians who administer them and to the industries and the employees.

It is probable, in fact we might say practically certain, that we will see many other plans tried, some based on plans already in effect and others embodying features or procedures yet untried. Some of the proposed schemes are repugnant to the medical profession because they involve departures from what considered judgment can approve on ethical grounds. The process of trial and error is probably the best method to follow where the field is so large and where so many diverse conditions are involved.

Some years ago the American Medical Association established the Council on Industrial Health. This Council

*"Variations in Industrial Medical Service Plan," reprinted from *J.A.M.A.*; copies may be secured from the A.M.A. Council on Industrial Health by request to DR. CARL M. PETERSON, 535 North Dearborn Street, Chicago.

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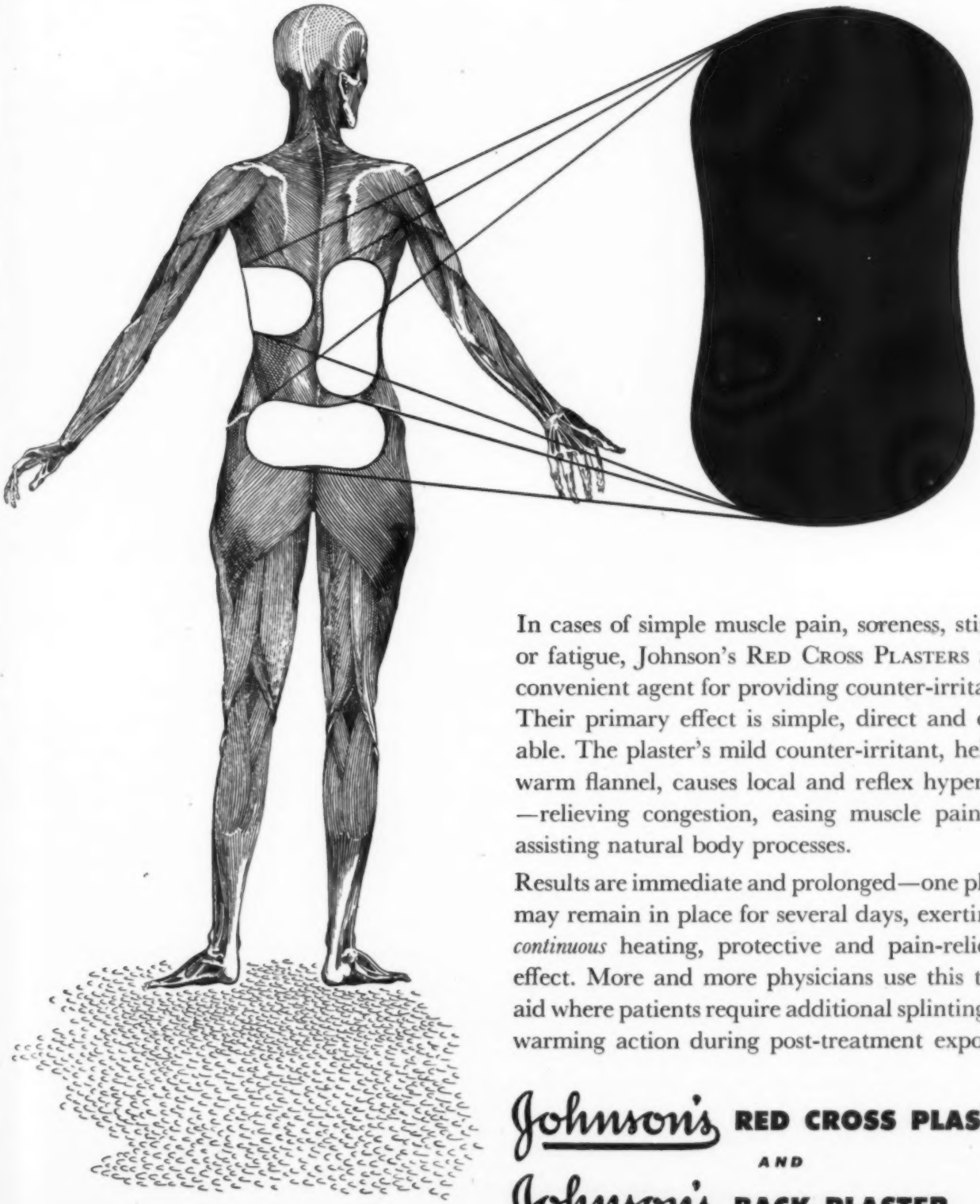

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is interested in industrial medical plans, and endeavors both by personal contact and by bulletins and articles in medical journals to keep the profession informed and to safeguard the ethical principles which must govern any plan that is to be acceptable to the profession.

More than half of all the wage earners in the country are employed in small plants which are not able to provide the type of full-time medical service that has come to be recognized as standard in the larger industrial establishments. But the employees of the small plants will demand, and have a right to demand, medical service of the same nature as that available in the large plants. The difference should be one of quantity and not of quality, whether we refer to the in-plant service, which is entirely a responsibility of the employer, or to an added or superimposed medical service including care for non-occupational accidents and illnesses and care of families as well.

Every year the American Medical Association holds its annual Industrial Medical Congress in Chicago at which this and similar problems are discussed. The Industrial Hygiene Foundation will have a panel discussion on pre-payment plans at its next annual meeting in Pittsburgh in November. These and similar meetings are drawing larger and larger audiences and more and more interest is being manifested in their content.

One phase of these meetings gives us concern, and that is that too few doctors attend. Industrialists, lawyers, representatives of all kinds of professional associations are there in force but the doctor is conspicuous by his absence. But no one has more at stake than has the doctor.

It is obvious that if the majority of wage earners work in small plants, the development of industrial medical services will revolve around the employment of part-time physicians; namely, the local physicians who to an increasing degree will give professional services to the industrial plants in their neighborhood.

The Council on Industrial Health maintains a field agent who visits state and local medical societies, both to keep them informed and to stimulate interest. It is of the greatest importance that the medical profession not only keep informed of what is being done, but lend their presence and their voice to shaping the future. There has never been a time when the voice of the physician in public affairs has been so badly needed as now. With such participation in the problems of medical economics, we may hope that the methods and procedures which will crystallize out of present activities will be both acceptable to and a credit to the medical profession.

Medical and Health Services

—In a Small Industrial Plant—

MAYNARD C. KISER, M.D.,
Tipp City, Ohio

EDITOR'S NOTE: *The accompanying article, written by Dr. Kiser on request, offers helpful information and suggestions for physicians who are directing medical and health services in moderate-sized industries. It outlines the program being carried on at the Kilgore Manufacturing Company's plant at Tipp City, Ohio, under the direction of Dr. Kiser. Many phases of the set-up there are adaptable to programs now being carried on, or contemplated, in factories of similar size in communities of comparable population—approximately 3,000.*

A MEDICAL department was deemed necessary at the Kilgore Manufacturing Company plant at Tipp City shortly after the onset of the present war when the company's personnel increased from approximately 100 to between 700 and 800.

Our present program was devised with three main ideas in mind: First, to give employees the benefit of emergency first aid for injuries and minor ailments; second, to decrease as much as possible, lost man-hours due to injuries and minor illnesses by both emergency first aid and proper placement of handicapped workers; third, to provide a means for cooperation with physicians in private practice of medicine rendering medical care to the plant's employees.

Facilities and Supplies

AT PRESENT our working facilities consist of two rooms equipped with supplies for performing physical examinations, for treating minor injuries, for giving first aid for minor illnesses and for keeping records.

The supplies consist of various antiseptics, dressings and instruments for small suture cases, burn ointments, etc. Very few drugs are dispensed. Those dispensed consist of the ones used in emergencies, since the only treatment given in illnesses at the plant is that which will offer the employee some immediate relief until he can consult his family physician. Obviously, this results in a mutual advantage to the employee and to the plant, providing the former with emergency care and reducing lost man-hours for the company.

Duties of Nurse

A NURSE is on duty eight hours daily —six hours during the first shift and two hours during the second. The reason for this arrangement is that there is not enough work on the second shift to warrant the employment of two full-time nurses. The nurse's duties consist of taking histories on all new employees, giving first aid in all injuries and illnesses occurring in the plant, and keeping records.

When a new employee is hired, he is seen by the nurse before going into the plant. She takes a history as to previous illnesses, operations, injuries and present state of health. In addition, she checks the temperature, pulse, weight and eyes.

If there is no obvious disability and no question about the employee being physically able to work, he is permitted to go into the plant. His record is kept in the incomplete file and his physical examination is completed by the plant physician during the next 24 to 48 hours.

If there is any question concerning disabilities and the placement of new employees, it is the responsibility of the nurse to consult the plant physician at once so the physical examination can be completed by him before the employee begins work.

Files and Records

COMPLETED records on all employees are kept in a permanent file. On the reverse side of the record, notations are kept concerning an employee's visits to the first-aid station whether for injuries or illnesses, i.e., as to what was the employee's complaint at the time of visit, what treatment was given and whether the employee was seen by the nurse or the plant physician.

The nurse is instructed that all injuries received in the plant are covered by the Ohio Workmen's Compensation Law and that any employee has the privilege of selecting his own physician. If an employee requests that his own physician be called, the nurse calls such physician, as under the company's policy an employee's physician is welcome to use the first-aid facilities of the plant.

Orders Issued Nurse

WHEN an injured or sick employee is brought into the first-aid station, it is the nurse's responsibility to determine whether or not a physician should be called and if there is any doubt, her instructions are to call one. A complete printed list of standing orders of the plant physician is displayed inside the supply cabinet as reference for the nurse in rendering first aid. She is instructed to give the employee only absolutely necessary advice and to refer him directly to his family physician for all illnesses.

Check of Returning Employee

WHEN an employee has been absent from work for more than 48 consecutive hours because of illness, he is called to the first-aid station by the nurse upon his return to the plant. The nurse is directed to find out whether or not the employee has been under a physician's care and if he appears to be physically able to work. No employee may return to work if he has an elevation in temperature. A questionable case must present a statement from the attend-

*In *Ohio State M. J.*, March, 1945.

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ing physician that the employee is physically able to work. It should be noted that a physician, who states that a person who has been ill recently is able to resume work, accepts a real responsibility, thus it should be very definite in the physician's mind that this is true.

Clerical Work

AS STATED, the nurse keeps the records of the physical examinations of new employees and visits to the first-aid station. Also, she fills out all forms required by the Ohio Industrial Commission, forwards them to the attending physicians and when they are returned, makes a duplicate copy for the employee's file, transmitting the original to the Commission.

Duties of Plant Doctor

THE plant physician spends a certain amount of time at the plant each day. His duties consist of making physical examinations on all new employees, directing the medical treatments given in the plant and cooperating with the safety committee in minimizing or eliminating health hazards in the plant.

A routine physical examination is done on all employees. If any abnormalities are discovered, the employee is questioned as to whether he is aware of the abnormality and whether he is under a physician's care. When any condition is found that is of sufficient importance to warrant placing the employee on a job which will not aggravate the condition, the personnel department is advised as to where, from the standpoint of health, it will be safest for the employee and where he can work most efficiently. There are few instances in these days that a new employee is rejected completely because of a physical defect.

It is the plant physician's duty to supervise the work of the nurse to see that employees are receiving proper care. He is responsible for reporting health hazards to the plant safety committee. In the event one type of injury becomes prevalent or an occupational disease occurs too frequently, he is expected to ascertain, if possible, what can be done to correct the offending agent.

Cooperation with Other Physicians

PERSONAL experience has shown that a plant physician will receive much better cooperation from other physicians in the community if he will discuss the conditions and problems of his plant with them. As a means of securing this kind of cooperation, the Kilgore Manufacturing Company has followed the policy of periodically inviting members of the county medical society to meet at the plant as guests of the management. On such occasions, discussions are held on various health hazards at the plant, prevailing occupational diseases and the policies of the company concerning treatment of injuries, emergency illnesses, etc.

Cooperation from Management

NATURALLY, it is much easier for a physician to direct a medical department in an industrial plant if he receives cooperation from the executives of the organization, meaning that he is allowed a fairly free hand in carrying on medical and health services and is not subjected to dictation on matters affecting his department. Such cooperation exists to a splendid degree between the executives and the medical department of the Kilgore Manufacturing Company.

Industrial First Aid—Eye Injuries

L. HOLLAND WHITNEY, M.D.,
Medical Director,
Sperry Gyroscope Company

DURING the time taken to read this paper, at intervals not exceeding three minutes (and probably a good deal less), one workman after another in some part of this country will have the anguish of a minor or major eye injury. The causative agent will vary. It may be large or small flying objects, a splashing liquid, flying dust or powder, injurious light rays or intense heat. All of these causes will contribute to this macabre parade of pain and disability.

It is probable that the number and severity of ocular injuries as a result of accidents would be far greater than present statistics indicate, were it not for the excellent natural protection with which nature has provided us. The strong bony walled orbital cavities, the protective layer of orbital fat, and the moveable eyelids all serve to provide a maximum of protection for these organs.

It has been estimated that in this country during 1941, there was an annual loss to employers, employees and the community in which they lived, of approximately $200,000,000. In these war years with the increased tempo of industry generally, the cost of eye accidents has undoubtedly reached a new high. Even more startling is the fact that the huge majority of these are preventable.

It is generally admitted that the number of cases which have been aggravated at the stage when first aid was indicated is unquestionably large. The well-meaning employee, who attempts to remove a foreign body from the fellow worker's eye with dirty fingers or a soiled handkerchief, is a common example. Such a procedure exposes the victim to dangers which are far greater than those inherent in the foreign body itself. Probably just as serious in terms of later developments are the simple, minor eye injuries which are neglected by the workman completely, until some complication sets in.

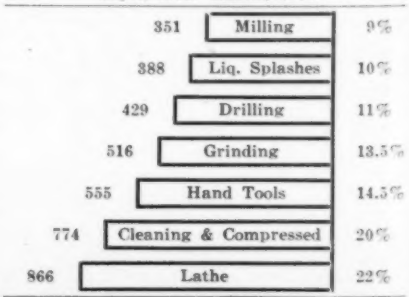
The eye problem in industry can be logically and broadly considered under three headings: (1) Determination of the processes in industry where eye protection is required. (2) A corrective-preventive program rather than a post-accident program. (3) Intelligent first aid and medical care where accidents occur in spite of the first two measures.

The industry with which I am associated is engaged in the manufacturing of precision instruments. We have a modern and well equipped foundry and a representative group of machining, assembly and inspection operations. This is considered a light industrial process and as such we should not have an unusually high incidence of eye accidents. Chemicals and solvents are used only as incidentals to the manufacturing procedure.

A study of our accident experience, however, does not bear out this theory of low incidence. Hand and finger injuries rank first in order, as would be predicted. Eye accidents are second in frequency, whereas average statistics show that they should be eighth or ninth. National figures indicate that 4% of all injuries happen to the eyes. Approximately 12% of all injuries reported to our plant hospitals are eye injuries. The majority of these occur in machining areas from flying chips. Within this machining area lathe operations are responsible for the largest number, grinding operations second and drilling operations third. The assembly areas are largely responsible for injuries caused by hand tools and liquid splashes. The injuries caused by cleaning with compressed air are chargeable to both machining and assembly departments.

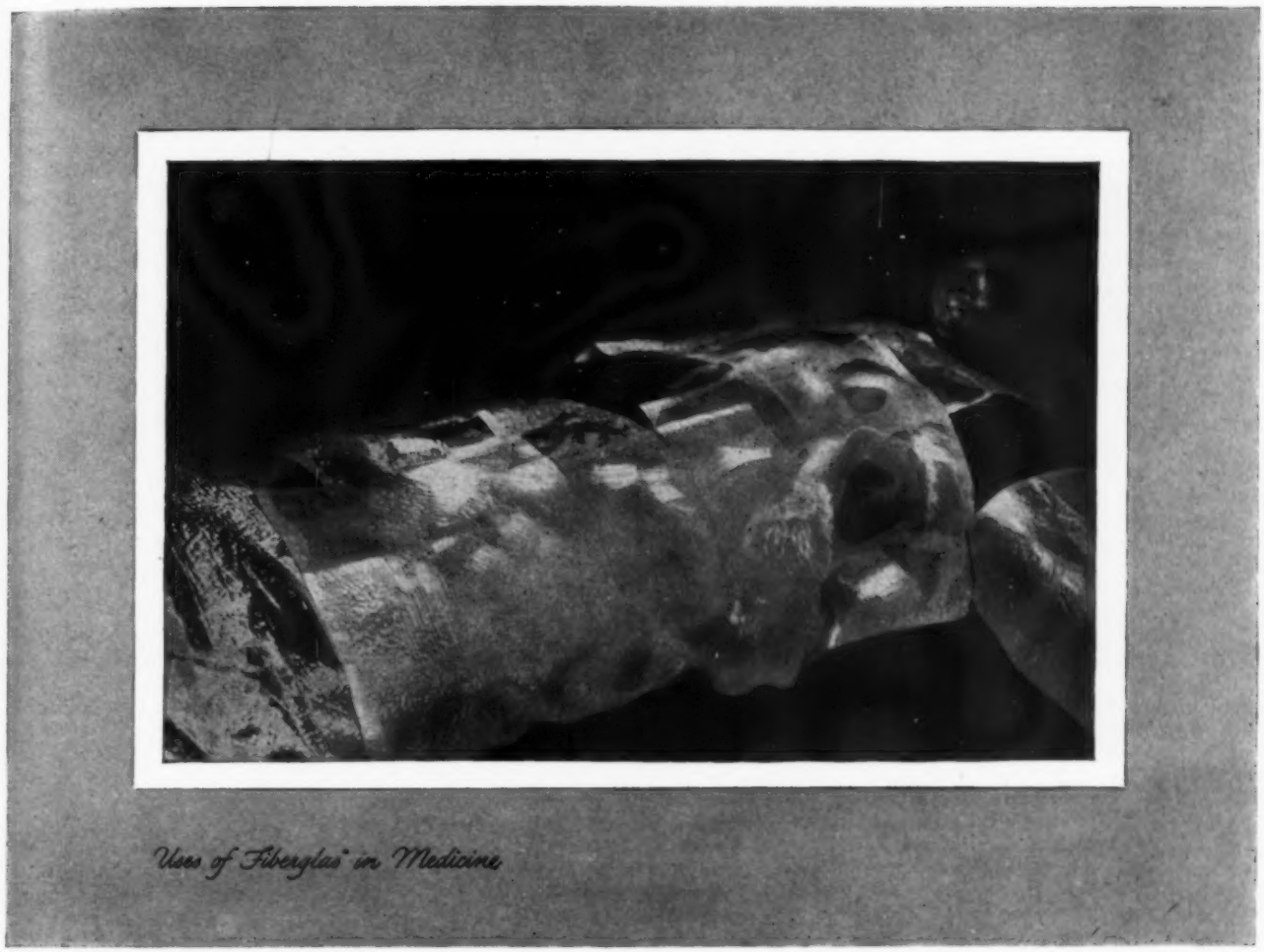
Because of the personal discomfort and pain, and the unfavorable effect on production and costs, we have determined to make a realistic approach to our problem. Thus, we are presently engaged in an eye protection program. In order to assure ourselves that this will be successful, we have approached the problem through two conventional methods. First, an educational program has been launched, with the full support and backing of the union and supervisory staff. In

EYE INJURIES
SPERRY GYROSCOPE CO.
Sept., 1943—March, 1944



4,145 EYE—12% of 34,176 TOTAL INJURIES

In *The Sight-Saving Review*, 14:3, 183-189, Winter, 1944.



Physicians, surgeons and others engaged in medical research have, in recent years, employed various Fiberglas materials experimentally and have found them uniquely fitted for certain uses.

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*T. M. Reg. U. S. Pat. Off.

this way we hope to secure the understanding and cooperation of the employees. Secondly, we have secured a mandatory ruling that all employees and visitors in the foundry and all machining areas must wear safety glasses. This program is still in its infancy. We have high expectations of the efficacy of such an approach.

Industrial medical departments must be set up to handle the emergency treatment of eye injuries. In our company, registered nurses are in attendance at all times when the plants are in operation. Special instructions are given on the care of eye injuries and accidents, and every nurse employed is competent to render skillful first aid. As in all first aid procedures, it is not only important that the nurse know what to do but also that she realize her limitations. A high percentage of the total number of eye injuries can be adequately managed in this manner.

The industrial physician should have a better-than-average understanding of eye care, and be prepared to handle the more complicated ones. Here too, it is a rule of our company that any major injury must be referred to an outside ophthalmologist for examination and further treatment as necessary. Such a plan protects the physician and the company and assures the employee of the best available care.

The facilities necessary for proper on-the-premises management of eye cases are not complicated or extensive. The usual sterile cotton and gauze, bandages, eye patches and some simple drugs will usually suffice. A binocular loup, foca-lite and an examining table are desirable where any considerable number of foreign bodies are removed. A small syringe with rubber adapter or a medicine dropper can be used for irrigations. A blunt spud is about the only instrument which is necessary for ordinary use. A lid retractor is useful under some circumstances but is rarely necessary.

The nature of the eye cases which are seen will vary considerably with the type of industry. Generally speaking, almost any type of injury may occur on occasion in almost any plant. The most common types of eye injury are foreign bodies, penetrating and non-penetrating, lacerations and punctures, burns of all types and scalds, and bruises and contusions. Resnick states that in an analysis of over 4,000,000 compensable and non-compensable eye cases, 90% were of the four major types mentioned above.

The greatest problem in first-aid treatment of eye injuries is that of preventing infection. Bacteria are carried on oil, grease, sand and dirt and sometimes even the atmosphere itself. Any wound received in a factory may become infected if it fails to receive prompt and efficient first aid.

Of all injuries occurring to the eye, chemical burns rank first, from the point of importance of immediate treatment or first aid. In areas of the plant where such accidents are prone to occur, the foreman or leader should be instructed to give immediate first aid before sending the worker to the medical department. This should consist of thorough irrigation of the eye with copious quantities of clean running water. The patient is then sent to the medical department. I am purposely leaving out any further discussion of the first aid treatment or subsequent treatment of chemical burns to the eye.

With the one exception noted above, first aid at the scene of an accident by fellow employees is forbidden. Almost any other type of eye injury is best sent directly to the plant medical department.

Thermal burns are met with less frequently and are generally less serious than chemical burns. These are usually treated by boric acid irrigation followed by the instillation of a bland oil. We frequently use ophthalmic butyn and metaphen ointment or metycaine and merthiolate ointment.

Lead and solder burns are usually less severe than those caused by molten metals with a higher melting point. The impact of the heated metal may inflict damage which is more serious than the burn. Irregular or jagged particles are likely to traumatize the eye more extensively than smooth, even surfaces. Because of the heated object, thermal burns are usually aseptic. Strict precaution must be observed to maintain this status.

Another type of injury is frequently produced by electric sparks, reflected light rays or welding flames. Here the lesion at first resembles an ordinary burn of the conjunctiva, with the resultant edema and redness. Later effects of these injuries may be cataractous lens changes, corneal scars and even occasionally damage to the retina.

THE most common eye injury which we see is the foreign body. These may be divided into two groups—superficial and penetrating. In the first instance, the nurse washes the eye gently with boric acid solution. If this does not remove the offending agent, she will attempt removal with a cotton applicator dipped in boric acid. In the event that this is not successful, the case is referred to the plant physician. An excessive amount of poking or the use of a spud by an unskilled person is dangerous practice and should be condemned.

In the event that the case is referred to the physician, a local anesthetic is usually necessary. We use a 2% Butyn solution and wait about five minutes after it has been instilled before any attempts are made at removal. The patient should be reclining and the physician seated at the head of the examining table with the elbows resting on the table. There is less likelihood of sudden motion or slipping, causing more extensive damage. A good light properly focused, clean hands and sterile instruments are of course all essentials. Occasionally 2% sodium fluorescin solution is used for staining purposes.

After removal, a drop of any of several mild antiseptics is applied followed later by an ophthalmic ointment and an eye patch. It is important to remember that the worker, who has had a local anesthetic used in his eye, should not be allowed to return to his machine without an eye patch. The patch and periodic application of the ointment are continued until the cornea is healed.

Penetrating foreign bodies which cannot be removed with reasonable ease, are treated by application of an aqueous local anesthetic, eye patch and bandage and the case referred to a hospital for care by a competent eye specialist. The same routine holds for corneal lacerations and punctures.

We experience seasonable and unpredictable waves of simple conjunctivitis. When there is evidence of purulent discharge, we routinely ask these employees to remain home from work for three to five days and take active treatment under the care of their own eye physician. There is every reason to believe that such cases are readily communicable and the final effect on production is better where they are isolated from their fellow workers. Simple non-purulent conjunctivitis which is mild in character is treated by irrigations, compresses and mild antiseptics. We often use a combination of zinc sulphate and adrenalin on such cases, with good results.

With the advent of fluorescent lighting, there have been numerous complaints regarding the effect on the eyes. We have no evidence that there is any appreciable or harmful ultraviolet radiation from such equipment. The individuals who feel that they must wear tinted lenses or have other special considerations are fortunately in the minority.

In summary, I would like to emphasize the need for prompt and skillful management of industrial eye accidents. Certainly such a program made available to all workers in both large and small plants will serve to reduce the tremendous number of eye casualties which are experienced each year. Spreading the gospel of proper first aid for the eyes will unquestionably produce dividends.

I am sure that we are all agreed that the most sound approach to this problem is through eye protection. Most eye accidents are preventable. It would seem logical that our best efforts be directed toward this measure.

The broad field of vision in industry is just beginning to open up. It offers great opportunity to those who will take an active interest and study the special problems which it presents. Perhaps the maintenance of visual fitness and job placement according to visual skills may contribute greatly in the reduction in unnecessary accidents of all kinds. I sincerely believe that the next decade will produce results in this particular field which may well prove an inspiration to industrial medicine in general.

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An Industrial Health Program for Federal Employees

VERNE K. HARVEY, M.D.,
Medical Director,
U. S. Civil Service Commission, Washington, D. C.

THE United States government is one of the largest single employers of civilian workers in the world. The government has done much to stimulate health programs for workers in private industry. The time is overdue when it should establish a sound health program for its own employees.

Illness caused an average loss of 10.2 days per employee in one large government department in 1942. The National Association of Manufacturers reports that the installation of medical and health programs in 234 industrial establishments was accompanied by a 29.7% reduction in absences due to sickness (other than occupational disease). If this one Federal department could improve its illness record by three days per employee, more than 246,000 man-days would be saved—the equivalent of 280 employees' full-time services for one year.

In these days of manpower shortages, no employer should be in a position where he is hiring additional people in the open labor market simply because he refuses to put into effect a health program for his employees. Certainly, the Federal government, functioning in the capacity of an employer, should not be in such a position.

H. R. 5257,* now pending in Congress, will, if enacted into law, give departments and agencies the authority, within the limits of their appropriations to establish health programs for their workers. It reads as follows:

A BILL: To provide for health programs for Government employees.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, for the purpose of promoting and maintaining the physical and mental fitness of employees of the Federal Government, the heads of departments and agencies, including Government-owned and controlled corporations are authorized, within the limits of appropriations made available therefor, to establish by contract or otherwise health programs which will provide health services for employees under their respective jurisdictions: Provided, That such health programs as are now being conducted for Federal employees may be continued until June 30, 1945. The health services provided for Federal employees shall be established only upon recommendation of the Civil Service Commission after consultation with the Public Health Service and shall be limited to (1) treatments of minor illnesses and dental conditions except in cases of emergency or of injury or illness sustained while in the performance of the employee's duty in accordance with the Act of September 7, 1916, entitled "An Act to provide compensation for employees of the United States suffering injuries while in the performance of their duties, and for other purposes," as amended (U. S. C., 1940 edition, title 5, ch. 15); (2) pre-employment and other examinations; (3) referral of employees to private physicians and dentists; and (4) education and preventive programs relating to health, including the alleviation of health hazards in the working environment. The Civil Service Commission shall serve as a coordinating agency in the development of such services for all Federal employees and, in collaboration with the Public Health Service, with respect to the extent to which such services shall be available to employees.

Sec. 2. This Act shall not apply to the Tennessee Valley Authority.

WARTIME employment in the Federal government has brought to light and accentuated a long-standing need of health programs for government workers. The Federal government, as an employer, has a definite responsibility in meeting the health problems of government workers. These problems in most instances have been dealt with inadequately in the past in the various departments and agencies. Although emergency rooms, under the supervision of graduate nurses, have contributed in some degree to increased efficiency of government employees, they have not met the needs of Federal employees, and the Federal government is in the position of rendering services which fall far below those of private industry. No agency-wide legal authority has existed in government for furnishing Federal employees with health programs such as those found in private employment.

Providing health services to government employees is primarily a question of promoting and maintaining their physical and mental welfare. Savings resulting from reduction of occupational diseases, accident frequency, and absenteeism are directly related to the over-all principle of maintaining and conserving human resources. In government offices and shops, ample provision has been made for the maintenance of machinery and tools. There is a need for giving at least an equal amount of attention to the human beings who use the machinery and tools.

The departments and agencies of the Federal government are taking the lead in providing disabled veterans with opportunities for employment. They will be faced with problems in placement and postplacement adjustment of veterans which will require that operating officials have health services, with competent medical personnel available for consultations.

The scope and standards of health programs should be consistent with:

A. The purpose of the department or agency.

B. The Federal government's responsibility as fixed by the Employees' Compensation Act of 1916, as amended.

C. The employee's natural allegiance to his own family physician.

D. The accepted limits placed upon industrial medicine.

The physician in charge of the program should be the health officer of the organization and should be highly qualified in the field of industrial medicine. His responsibilities and the scope of his program would be divided into three main categories:

I. Preventive services.
II. Advisory and diagnostic services.
III. Treatment.

Such a program would be accomplished through the following:

I. *Preventive services*
  A. Health examinations:
    1. Pre-placement.
      (a) Original.
      (b) Reassignment.
    2. Periodic.
    3. After illness.
    4. To determine fitness for continuing assignment, separation, change of duty, or retirement.

The purpose of health examinations in an industrial health program for Federal employees is to aid in the judicious placement of workers in jobs they can perform efficiently without being a hazard to themselves or others. Such examinations should not be used as a tool for unjust exclusion or to narrow the field of competition.

  B. Promotion of adequate environmental hygiene:
    1. Sufficient lighting and ventilation, safe water supply, proper distribution of food and disposal of garbage, and insect and rodent control.
    2. Fatigue prevention measures—such as noise reduction, adequate rest periods, vacations, refreshments, and posture aids.
    3. Elimination or control of specific occupational hazards due to certain solvents, gases, dusts, and other allied causes.
  C. Control of communicable diseases:
    1. Tuberculosis.
    2. Venereal diseases.
    3. Others.
  D. Mental hygiene:
    Cases of workers who show indications of emotional disturbances would be referred to the physician in charge for study.
  E. Health education in which various media are used in presenting such subjects as:
    1. Nutrition.
    2. Health hazards (seasonal and general).
    3. Physical fitness.
    4. Communicable diseases.
    5. First aid.
  F. Health records:
    These should be confidential and kept in the Health Unit.

II. *Advisory and diagnostic services*
  A. Acquainting the worker with his physical condition and as-

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Presented before the Industrial Hygiene Section of the American Public Health Association at the Seventy-third Annual Meeting in New York, N. Y., October 3, 1944; published in *American Journal of Public Health*, March, 1945.

*H. R. 5257 was introduced in the 78th Congress. H. R. 284 is now pending in the 79th Congress. In H. R. 284 Section 2 is deleted and June 30, 1946, has been substituted for June 30, 1945.

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sisting him in maintaining good health.

B. Evaluation of employee's symptoms and referral to private physician.

III. *Treatment*

A. Prompt and efficient handling of illnesses and injuries occurring while employees are on duty by providing treatment on the spot and referral to proper facilities for complete and adequate care.

B. Treatment, on the job, of minor non-compensable injuries and diseases, with the object of keeping employees at work.

C. Emergency care for serious non-service-connected injuries or diseases, and referral to a private physician or hospital.

D. Special treatments to be given only upon the written request of the employee's private physician.

In order for such a health program to function efficiently it should be placed administratively as high in the organization as feasible to enable the physician in charge to have access to top management, and to insure close cooperation with the personnel, safety, and other divisions of the agency which may be concerned.

With regard to the personnel necessary for the efficient operation of the program, there should be at least one medical officer per 4,000 to 6,000 employees, the exact ratio depending upon such factors as distribution of employees, number of shifts worked, extent of industrial hazards, employee turnover, etc. Nurses required should be on the basis of one per 500 to 1,000 employees, the ratio depending upon the above mentioned factors. The number of stenographic, clerical, and other types of supporting personnel would depend upon case load, number of rooms, distribution of employees, etc., but in any event the number should be adequate to avoid the necessity of doctors and nurses performing routine clerical and other non-medical duties.

In considering these programs, it is well to emphasize that the proposed legislation, providing health services in government departments and agencies, is not intended to displace the private physician's services to government employees in the community. One of the purposes of the programs is to aid the private physician in maintaining contact with regular patients who are in need of medical treatment and observation. New patients who have been found to require medical treatment and observation would be referred to him. If, in such a program, emphasis were placed on treatment to such an extent as to exclude proper referral to private physicians, the program would become enmeshed in procedure; its proper function would be hindered and its purpose destroyed.

The establishment of health programs for government workers would permit government agencies to conserve their human resources, as they now conserve their inanimate resources, and would be not only humanitarian but also "good business," because it would improve employee efficiency and morale.

Industrial Vision Institute

THE Industrial Vision Institute, Division of Education and Applied Psychology, Purdue University, is a three-week intensive, practical course on the installation and operation of a vision program for an industrial plant, business office, or an organization where employees should have efficient vision. The course covers the practical content and results of several years of intensive research at Purdue on the economic value of efficient vision to management and employees. Several years ago members of the Division of Education and Applied Psychology began investigations on the importance of efficient seeing in industrial jobs. Subsequently, this research was broadened into a cooperative program with the Bausch & Lomb Optical Company and with representatives of the medical and optometric professions. The research includes both laboratory and field studies in many types of industry. It is evident from this work that some employees see more efficiently on their jobs than other employees; that those with certain visual skills are better on the job; that desirable visual skills are not the same for all jobs; and that adequate vision for the job results in more production, greater accuracy, better quality, less waste, less fatigue, fewer accidents, more rapid learning among new employees and more satisfied and permanent employees. No single test of vision is adequate for selecting and placing employees on different jobs. Arbitrary standards of vision result in the loss of many potentially good workmen, who have adequate and even desirable vision for some jobs in the plant. The course covers the use of a visual-fact-finding system that can be applied effectively in any plant. This fact-finding system makes use of the Ortho-Rater, an instrument developed especially for this work. The instrument has been thoroughly tried in a variety of industrial plants and is now in use by some of the leading companies in America. It accurately measures 12 visual skills of an employee in an average time of five to six minutes. The program includes specific methods and procedures for discovering where economic savings can be made by proper consideration of employee vision and for showing how such savings can be achieved. The use of this fact-finding system is taught in the Industrial Vision Institute. This is conducted in a combination classroom-laboratory equipped and maintained for this special work. The course of study provides information and training in various aspects of an industrial vision program. Visual skills, skill tests, and testing; standard practice in the administration of the rapid battery of 12 visual skill tests in the Ortho-Rater, with supervised practice, participation in this planning, scheduling, and actual completion of a visual testing program involving several hundred subjects; summarizing and analyzing group data from vision tests; visual job analysis — determining appropriate visual standards for specific jobs; employee relations in a vision testing program—introducing and scheduling tests with foremen, supervisors, union representatives; management relations in a vision-testing program—integrating the results with the problems and objectives of medical, employment, training, safety, production, standards, and inspection departments; reporting evidence, conclusions, and recommendations to management; evaluating the economic gains from the vision program; visual problems of employees with respect to age, sex, and length of experience on different jobs; lectures and demonstrations by guest speakers on visual safety, optical devices, illumination, color, job engineering for visual efficiency, industrial relations, and professional relations with industrial physicians, optometrists, ophthalmologists. Each student also has individual interviews with members of the staff and personal help in organizing his ideas in line with the specific objectives and problems in his own plant. Persons who complete this course are qualified to conduct this fact-finding system, to train their own assistants, to analyze and summarize the evidence they gather, and to report and make recommendations to their managements. They also have access to continued help and counsel from the Purdue staff and consultants in the fields covered during the course, and to the services of a central statistical laboratory and clearing house of pertinent information. Students at the Institute are representatives of industries that have undertaken to install or expand their own programs of employee vision testing and are selected by the management of the industry they represent, subject to the approval of the Institute staff. Applications for admission should be accompanied by a description of the jobs and backgrounds of the nominees. The success of the training and of the visual program in the plant depends a great deal on the men and women delegated to do this work. The choices of various industries who have participated have set a high standard in the selection of these persons. The most important qualification is familiarity with the management organization, policies, personnel practices, jobs, production problems and objectives of the vision program in their own plants. Background in any of the following fields is helpful: personnel, industrial relations, psychology, elementary statistics, motion and time study, employee training, safety or

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A most interesting comparison of dermatitis control was completed several months ago covering a period of five months. In a plant of 2000 employees, the following number of cases were reported prior to use of the *Kolar plan:*

August	28 cases	November . . .	77 cases
September . . .	54 "	December . . .	36 "
October	64 "		

(*Or an average of 54 cases per month*)

Under the Kolar plan of dermatitis control, the following record was noted:

January	11 cases	April	13 cases
February . . .	22 "	May	10 "
March	8 "		

(*Or a decrease of 75% for a five-month average*)

Workers in this plant show a preference for the Kolar plan, which is both simple and effective. They:

1 Apply ELEVEN THIRTY-TWO Protective Cream before starting work to hands and all exposed parts of the body. This cream resists water-soluble irritants, yet may be readily removed along with impurities by washing. There is no "secret" formula involved. It is a protective compound of *lanolin*—in sufficient quantity to do a thorough job.

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A GUARANTEE—based on your experience. Best proof of the value of these dermatitis preventives is your own experience. You can get this experience at no cost by using the Kolar Laboratories' *trial offer.* We will ship prepaid six one-pound jars of ELEVEN THIRTY-TWO Protective Cream, and (one gallon) of Foaming Oil Cleanser invoicing in the regular manner, but with the distinct understanding that this invoice is not to be paid unless the preparations measure up to your expectations in every way.

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industrial health. Sometimes two delegates from the same plant share between them the desirable background. Previous college training or familiarity with college training methods, is desirable but is not requisite. Industrial representatives who have attended the Institute have come variously from departments of personnel services, health and medical, employment, training, safety and inspection. Some of these are now reporting to governing committees representing various departments that have an interest in the program. Staff of the Industrial Vision Institute: JOSEPH TIFFIN, PH.D., Professor of Industrial Psychology; S. EDGAR WIRT, PH.D., Assistant Professor of Industrial Psychology; C. H. LAWSHE, PH.D., Association Professor of Psychology. Guest speakers cover many related phases of industrial vision. In previous Institute sessions the following have addressed this group: JOHN H. COLEMAN, PH.D., Placement Research Analyst, Sperry Gyroscope Company; WILLIAM DARLEY, Illuminating Engineer, General Electric Company, Nela Park Laboratories; A. C. ECKERMAN, M.A., Personnel Manager, Wright Aeronautical Corporation; RICHARD FEINBERG, B.S., F.A.A.O., Eye Service Section, Medical Department, Sperry Gyroscope Company; H. GLENN GARDINER, M.D., Medical Director, Foote Brothers Gear & Machine Corporation; FRED JOBE, Scientific Bureau, Bausch & Lomb Optical Company; HEDWIG S. KUHN, M.D., Ophthalmologist, Joint Committee of Industrial Vision of the A.M.A. and the American Academy of Ophthalmology; JOSEPH LO-PRESTI, M.D., Surgeon, U. S. Bureau of Public Health and the National Society for the Prevention of Blindness; MARVIN E. MUNDEL, PH.D., Assistant Professor of Industrial Engineering, Purdue University; ERNEST PETRY, Optometrist and Educator, Eye Clinic, Bausch & Lomb Optical Company; RAY REED, Industrial Vision Department, Bausch & Lomb Optical Company; C. O. SAPPINGTON, M.D., DR.P.H., Editor, INDUSTRIAL MEDICINE; CARL F. SHEPARD, D.O.S., Committee on Industrial Vision of the American Optometric Association; LEO A. SHERIDAN, O.D., Optometric Lecturer; R. A. SHERMAN, Industrial Vision Department, Bausch & Lomb Optical Company. The current institute began April 30 and will close May 18.

GENERAL

—*Continued from page 20.*

icine—Scope, Present Status, Future Possibilities"; HANS H. REESE, M.D., Madison, on "Psychoneuroses and War"; JOHN A. TOOMEY, M.D., Cleveland, on "Laryngeal Emergencies in Children"; and the following on the diagnosis and treatment of Poliomyelitis: HERMAN WIRKA, M.D., Madison, "Symptomatology in Signs of Acute Anterior Poliomyelitis"; DR. TOOMEY, "Differential Diagnosis of

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Poliomyelitis from other Neuron Lesions"; DR. REESE, "Poliomyelitis as seen by the Neuropsychiatrist"; DR. WIRKA, "The Immediate Orthopedic Treatment of Anterior Poliomyelitis." On each of the Clinic days, following the afternoon scientific session, there will be four simultaneous round-table dinner groups on the four subjects: "Industrial Medicine" (DR. SAPPINGTON), "Infectious Diseases of Childhood" (DR. TOOMEY), "Neuropsychiatric Problems of Returning Veterans" (DR. REESE), and "Diagnosis and Treatment of Poliomyelitis" (DR. WIRKA). DR. HAROLD M. COON is Coordinator of the program.

Ohio Reorganization

SIX additional divisions of the Ohio State Department of Health have been created by the Ohio Public Health Council. The board abolished the division of audits and reports and created the division of administration in its place. The administration division will be headed by JAMES E. BAUMAN, assistant health director. Other divisions established were those of communicable diseases headed by DR. WALTER SMITH, Columbus, formerly a department under child hygiene; the division of sanitary engineering under F. H. WARING, Columbus, formerly a part of the engineering and environmental sanitation division; venereal diseases, headed by DR. JOHN P. TURNER, who is lent to the State Health department by the U. S. Public Health Service, and the division of industrial hygiene, under JOSEPH FLANAGAN, also of the U. S. Public Health Service. "We feel that this organization recommended by the council will allow better health service to the people of the state," DR. ROGER HEERING, State Health Director, said. Industrial hygiene and venereal diseases were formerly a part of the adult hygiene department. A tuberculosis division of the State Health department was set up in December. Other divisions include dental hygiene, vital statistics, nursing, child hygiene and laboratory service. DR. LYMAN HUFFMAN, of Cleveland, is chairman of the Ohio Public Health council.

—*Toledo Times*, March 26, 1945.

Oregon

THE house sounded the knell Friday on a bill to reorganize the state board of health by passing a resolution authorizing the board to survey industrial plants on request of the state industrial accident commission.

—*Portland Oregonian*, March 17, 1945.

Rhode Island Reports

STATISTICAL analysis of the first year's experience with cash sickness insurance has been released by Rhode Island, first state in the Union to include such benefits as a part of its unemployment compensation program. The report is being studied by the Statistical Unit, Industrial Hygiene Division, U. S. Public Health Service. Administered by the Rhode Island Unemployment Compensation Board, the sickness insurance plan covers those workers covered by unemployment compensation, with its fund built up entirely through the payment of 1% of their earnings up to $3,000 by the covered employees. Approximately 300,000 persons participated in the program. In the 60-page report benefit payment experience is classified by type of illness; by sickness benefit payments to men and women according to type of illness; by age of beneficiary, total and male and female; by occupation of claimant, total and male and female; by age of beneficiary in relation to specific sickness; and in other ways. Reports of experience in Rhode Island are expected to furnish a valuable source of information to public health statistical authorities and others.

—*Industrial Hygiene News Letter*, March, 1945.

States Support Industrial Hygiene

GREATER support of industrial hygiene activities as a part of the general health program in many states is indicated by current legislative action. Although every state health department, under its organic act, has ample authority to act in industrial hygiene, a number of states have expressed their intention to develop this phase of health activity through specific acts establishing or supporting industrial hygiene divisions. Wyoming is the latest state to join those having industrial hygiene services; an Act signed by Governor Lester C. Hunt February 23 established an Industrial Hygiene Service in the State Board of Health, with an initial appropriation of $15,000. The General Assembly of Arkansas has just passed an appropriation measure earmarking special funds for the Division of Industrial Hygiene of

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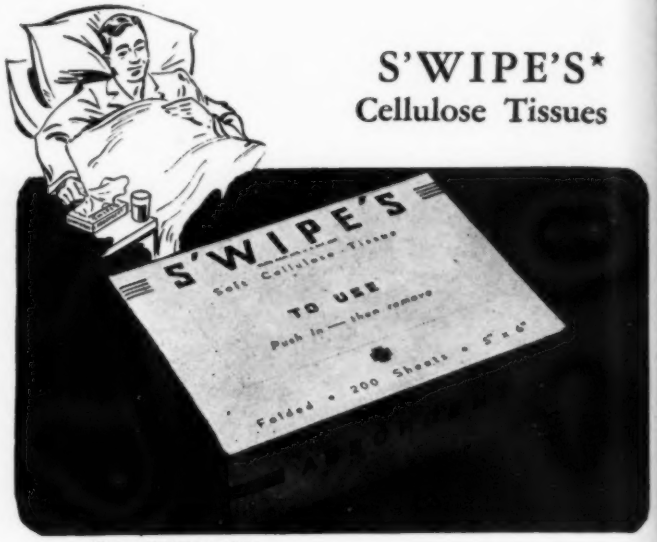

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the State Board of Health. These provide salaries for two years for an industrial hygienist, a chemical engineer and a clerical staff, as well as for travel and general maintenance. In Tennessee, a bill strongly supported by industry, labor, and other state forces has just been passed giving legal status to a Division of Industrial Hygiene in the State Board of Health and appropriating $40,000 a year for its work. DR. R. H. HUTCHESON, Commissioner, State Department of Public Health, gives particular credit to the Manufacturers' Association and organized labor of his state for support which led to enactment of this measure. Under the General Public Health Law, industrial hygiene services have been carried on since 1937. At the date of writing, New Hampshire's bill to vest sole authority for industrial hygiene in the State Health Department has passed the House and is pending in the Senate. A number of other Legislatures are considering bills of similar nature.

—From *Industrial Hygiene News Letter*, March, 1945.

A.M.A. Pre-placement Standards

STANDARDS to guide medical directors of industry in evaluating the mental and physical qualifications of applicants for employment will be prepared and distributed throughout the nation, it was decided at a meeting of a subcommittee of the Council on Industrial Health of the American Medical Association, held February 21 in Washington. The meeting was attended by Council members, by representatives of the Industrial Hygiene Division, U. S. Public Health Service, and of the War Manpower Commission and the Office of Vocational Rehabilitation of the Federal Security Agency, together with representatives of the Chamber of Commerce of the United States, the National Association of Manufacturers, organized labor, and industrial insurance companies. Purpose of this action is to establish accepted general standards to guide personnel directors in industrial job placement. A simplified plan for analysis of an applicant's capacity in relation to job requirements has been worked out by the War Manpower Commission, and will be used by the Council in its deliberations. Operation of this plan in several selected industries will be observed and analyzed. When these standards have been developed, they will be made available to the medical profession and to industry. Ratings now in use will be changed to conform better with personnel needs and to cover handicapped war veterans returning to industry. Active support for this project has been pledged by the management and industrial organizations represented.

—*Industrial Hygiene News Letter*, March, 1945.

COMMENT and OPINION

—*Continued from page 28.*

don't talk; the enemy may be listening. In the Federal Security Agency's book that comes under the head of security stuff. In fact reporters were ousted from the 'physical fitness for women' conference just as Dr. Margaret Mead, of the National Research Council, was talking on that very subject. Dr. Mead said earnestly: 'There are two sexes and we simply must recognize the fact. Any society which takes one sex as a pattern is doomed.' At that point reporters got the heave-ho. They were told that coy representatives of Army and Navy, selective service and other government agencies 'simply won't talk before the press' for 'security reasons.'" (MARTHA KEARNEY, from Washington, in *Chicago Herald-American*). . . . THE NURSE shortage: "There was apparently no scarcity of nurses in World War I. Why should there be now? Here are, I think, some of the reasons: One nurse, who tried to join up, was turned down because she was over-weight, although she has been carrying on efficiently in

Chatham

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her present job. Then, the Red Cross refuses to take registered graduate nurses whose hospitals, during their period of training, had a daily average of less than 50 beds. Some of these nurses have specialized in the various field of nursing, and have also had post-graduate or college work. Should not a nurse who has graduated, successfully passed her state board examination, and practiced in the state in which she is registered, be eligible for work in the Army or Navy without counting the beds in the hospital or measuring her poundage?" (R.N., in "Voice of the People," *Chicago Tribune*).

Human Nature

Two years ago this month, Rhode Island put into effect what many regarded as a rather startling innovation in social legislation. This innovation was popularly known as a "cash sickness insurance" system. In brief, it provided cash benefits to workers unable to perform their tasks because of illness. The system has been financed by a 1% payroll tax on workers covered by the Rhode Island unemployment compensation law. The maximum weekly payment was established at $18, with no individual permitted to receive more than $364 in total payments, nor benefits for more than 21 weeks in any year. Workers could, however, receive simultaneously both sickness benefits and compensation for injuries sustained at work. The legislators who devised the system congratulated themselves and everything was lovely—at least so far as anyone outside of Rhode Island knew. But after the first year, the system began to encounter difficulties. Now, at the end of its second year, it is about to break down completely unless something is done quickly to prop it up. Why has it broken down? Well, largely because human nature—which few social reformers ever bother to consider—is still human nature. The *Monthly Labor Review* of the U. S. Department of Labor discloses some of the experience of the system's administrators. Hundreds of workers covered by the law were found still at work while being paid for illness. Thousands presented the authorities with benefit claims which could not stand up under competent medical examination. Still others applied for and received sick benefits and then took temporary jobs elsewhere until the benefits ran out under the statutory limitation. Auditors have twice recommended certain reforms designed to preserve the solvency of the fund from which benefits are paid, but each time—and this is typical, whether it be Rhode Island or the government of the United States—they encountered immediate opposition from organized labor which wanted, not reform, but more and bigger benefits. Net benefits paid in the system's first year of operation were $3,774,310; but in the first *seven months* of the second year, payments were $3,441,896. During the seven months ended last October, total expenditures—administrative and beneficial—exceeded income under the 1% payroll tax by $600,000 and the balance in the fund was reduced to $2,758,685. Now, in order to keep the system from falling apart, Rhode Island is up against the necessity of having to urge reforms which the state government knows will be politically unpopular—perhaps politically impossible, as is so often the case. What is needed, of course, is elimination of double benefits, a definition of illness that will minimize the possibility of malingering and probably a boost in the payroll tax to 2%. We live and learn. Or do we?

—Wilbur J. Brons, in *Chicago Journal of Commerce*, March 30, 1945.

Industrial Nursing Course Results

From *Connecticut State Med. J.*, March, 1945: "The first venture of the University's School of Nursing in Industrial Nursing Education can indirectly be traced to the interest in our problems shown by a joint committee on Industrial Nursing Education representing the Connecticut State Medical Society's Committee on Industrial Health and the Connecticut State Nurses' Association. Inspired by the study of this

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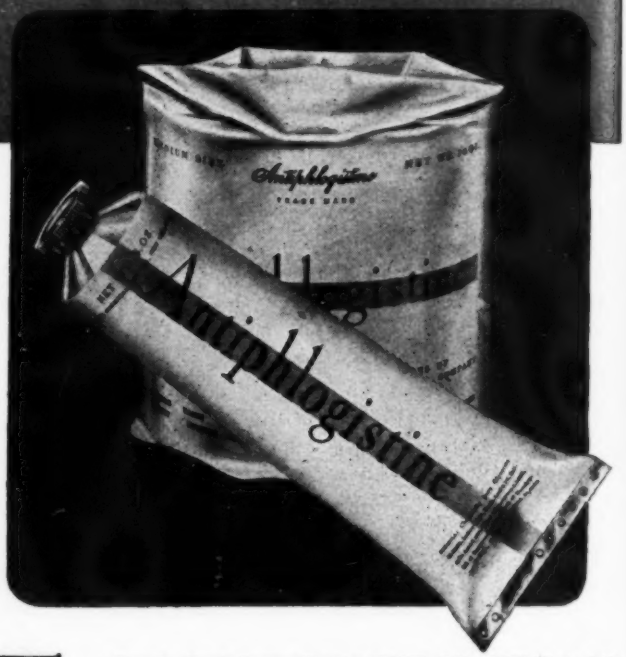

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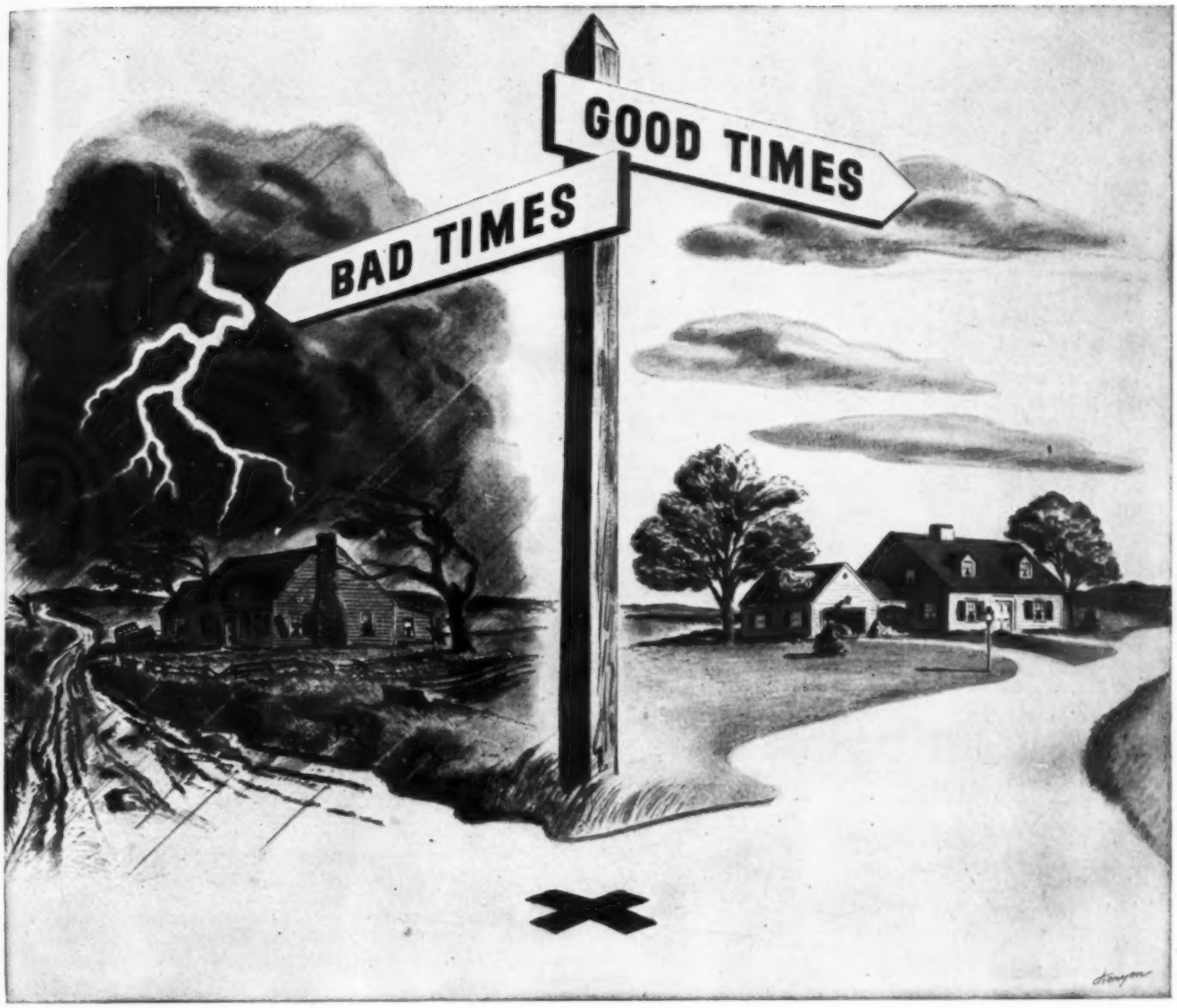
group, the Industrial Nursing Section of the Connecticut State Nurses' Association met with MRS. CAROLYN L. WIDMER, Dean, School of Nursing, in 1944 and jointly sponsored the course which has just recently been completed. The course was made up of 15 two-hour periods with one period reserved for an examination. Successful completion entitled the nurse to two college credits. The course, which was coordinated by an industrial nurse, used five industrial physicians, three industrial nurses and one safety engineer as lecturers, each having agreed to discuss a phase of the nurse's functions and problems. Two plants were visited to demonstrate the various functions of the nurse, first a large plant to show specialization of duty and second, a small plant to show the variety of functions served by the nurse in the small plant. Enrollment reached 24 industrial nurses representing 11 firms in an area extending from Manchester to Meriden. That 20 of these nurses completed a term paper, for presentation at a seminar discussion, demonstrated sustained interest. Fourteen of the original group submitted a written examination as required for University credit, all of whom successfully completed the examination. In an open discussion at the close of the course all were agreed that as a basic course we had come near our objective; that we should go on and add more specific information about occupational hazards and diseases; that we should follow the pattern of utilizing diverse experience by using various lecturers; that the plant tours were worth while; that information concerning non-occupational health problems justified greater emphasis; and that discussions of in-plant relationships would be very interesting (such as a two-way discussion between a physician and a representative of personnel management). Copies of the course outline may be obtained from the University. In closing may we thank the following members of the Connecticut State Medical Society for actively and interestingly contributing to the success of the course: JOHN N. GALLIVAN, MARTIN I. HALL, ANDREW J. JACKSON, ISRAEL OTIS, CRIT PHARIS, CHARLES F. YEAGER."

—CAROLYN L. WIDMER, R.N., Dean, School of Nursing, University of Connecticut; JESSE C. WILLIAMS, R.N., Assistant Supervisor of Nursing, Pratt & Whitney Aircraft.

CURRENT ARTICLES of QUALITY

—Continued from page 46.

be the basis for other diversified preparations. Resinous compounds of utility in impregnating and molding were also discovered. As this collaborative research went forward it was realized that efficient production would require the assistance of experience in technochemical procedure. The Dow Chemical Company undertook to evolve production methods and the outcome was the formation of the Dow Corning Corp., which is manufacturing these materials in a large new plant at Midland, Michigan. The products resulting from this teamwork vary widely in physical characteristics. Fluids are being made that have high heat stability and low freezing points, with exceedingly small slope to the temperature-viscosity curve. Greases have been developed that retain a petrolatum-like consistency between –40°F and 400°F; they have found uses as lubricants or electrical sealing compounds where corrosive and high-temperature conditions prevail. Water-repellent compounds that are neutral in reaction are available for application to ceramic insulators and the like. Resins are in production that are natural complements to inorganic spacing materials and have thus given rise to a new class of electrical insulation, unique for its heat-resistance and moistureproofness. The laminating type of resin employed in conjunction with glass cloth affords sturdy panels that are electrically non-tracking and are not flammable. Relaxation of secrecy orders permits the statement that temperature-resistant elastic types of silicones have been under development here for several years and that some of them are now on the market. Practically all the materials produced were originally completely allocated to war purposes and have helped in the solution of problems



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presented by the Armed Forces. This laudable cooperative program has built a completely new division of chemical products, obtainable in quantities for increasing the potentiality of many dustries."

Turn About is Fair Play

EDITORIAL, in *Chicago Daily News*, March 28, 1945: "'Readjusting the veteran' is becoming cant and cliche, simply because the subject is overtalked and overwritten. Some veterans will need readjustment. Most of us could stand a bit of it after a war. In fact, we'll be readjusted in many ways, whether we like it or not. Except for wounds, crutches and the like we fail to observe many maladjustments among returned veterans. Most of them seem to be as sound as they were when they went away, only more experienced, mature and self-reliant. Can as much be said for the civilian population? Lots of 'war neuroses' there apparently. This may be a new-fangled war, but the men fighting it are mostly good standard human stock, and the reactions of their type to former wars suggest that they are able to do most of their own readjusting. Twenty years after the Civil War the leading merchant, the local judge and the president of the First National Bank were usually veterans. They became the balance wheels of American communities. After the disbandment of Cromwell's army, England's first standing army, there was great fear of what those terrible men might do. In later years if one found an unusually competent linen draper, green grocer or blacksmith, Macaulay tells us he was more than apt to be one of Old Noll's old soldiers. Why not a study of civilian readjustment by a representative committee of servicemen, including Army and Navy medical men?"

Physical Fitness

DR. MORRIS FISHBEIN, Editor, *Journal of the American Medical Association*: "The purpose of a physical fitness campaign is not the development of big muscles or of extraordinary endurance. Physical fitness implies that the heart, lungs, teeth, eyes and other organs are physically sound and capable of working efficiently. Physical fitness implies the ability to do hard muscular work and to produce sudden bursts of energy and long-sustained effort. Physical fitness implies, finally, specific fitness or skill in certain performances. In the armed forces physical fitness is geared to make the man capable of meeting any demands that may be placed on him. But physical fitness is needed not only by our students and by the men in our armed forces, but by every man and woman in the country, particularly in times of total war. Especially is physical fitness needed in industry where the man's fitness must be geared to a specific job. More and more industries in the United States are beginning to require complete physical examination as a condition for employment. The Council on Industrial Health, of the American Medical Association, working with representatives of management and of labor, has developed a form for determining the physical condition of workers and for maintaining continuous records of the study of the workers' health and fitness. About one-fourth of the prospective employees of the Eastman Kodak Company are rejected because of deficiencies of vision, and more than 13% because of deficiencies of the heart. Our Army and Navy rejected 6.3% of the applicants because of mental or nervous unfitness. This type of fitness must also be included in any comprehensive program for improving the general health of the nation. The Joint Committee of the American Medical Association and the National Committee on Physical Fitness, which on September 1, 1944, began an intensive program for physical fitness, represents the devotion of the knowledge that medicine has gained about life and health, and that experts in the field of physical education and recreation have developed to overcome many of the preventable and correctible defects that were responsible for two-thirds of the rejections of men who were unable to meet the needs of the armed forces. Physical fitness is not a matter, as I have said, of muscles alone. It includes the practice of good personal hygiene and the application of established knowledge to improving the health and fitness of the human body. It includes enough sleep, the right kind of ventilation, and continuous emphasis on cleanliness. It demands proper nutrition, good posture, controlled exercise, and rest. It embraces mental hygiene and a program of recreation. When all of these ingredients are included in a scientifically-compounded prescription, the result is *recovery and cure* for America's physically unfit."

BOOK REVIEW

Industrial Toxicology

Review by
WILLIAM D. McNALLY, M.D.

INDUSTRIAL TOXICOLOGY by DONALD HUNTER, M.D., F.R.C.P., London, Physician to the London Hospital; published at The Clarendon Press, Oxford.

THIS text covers the Croonian Lectures of 1942 of the Royal College of Physicians of London. It covers 71 pages of text; seven pages of bibliography, and an index. The author has divided the subject into four sections, as follows: The Metals: lead, arsenic, mercury; the Aromatic Compounds: benzene, aromatic nitro- and amino-derivatives, tri-ortho-cresyl phosphate; the Chlorinated Hydrocarbons: methyl chloride, carbon tetrachloride, ethylene dichloride, tetrachlorethane, trichlorethylene, chlorinated naphthalene; the Glycol Group: ethylene chlorhydrin, diethylene dioxide. Twenty-five pages are devoted to the Metals; 25 to the Chlorinated Hydrocarbons; and three to the Glycol Group.

Much of the material in these lectures is covered in textbooks on toxicology and industrial hygiene. The author has not kept up-to-date on the newer methods of the detection of industrial poisons. For instance, on page seven, he speaks of the Fairhall method for the quantitative estimation of lead which is out-dated; we use the dithizone and polarographic methods for lead and other metals.

For medical students, the book offers a brief text to show how chemical substances excrete their toxic effects in industry, and to impress upon them that some of these poisons are absorbed by inhalation, others through the skin, and that some attack the liver causing a toxic jaundice, while others like mercury may attack the kidney causing a suppression of the urine, and still others may act upon the blood or bone marrow. The methods of treatment are very brief.

TEN YEARS AGO in INDUSTRIAL MEDICINE

CAREY P. McCORD, M.D., F. R. HOLDEN, PH.D., and JAN JOHNSTON, "The Basophilic Aggregation Test for Lead Poisoning and Lead Absorption, Ten Years After its First Use," in INDUSTRIAL MEDICINE, 4:4, 180-185, April, 1935. Summary: "A need has long existed for a simple laboratory test serving as an index of lead absorption and the imminence of lead poisoning. An approach to such a test was described by us in 1924. Through technical improvements made by others and by us, this procedure is now suited to application by any physician or laboratory doing blood work. The basis of the test is the enumeration of the totality of erythrocytes containing basophilic substance rather than qualitative or quantitative examinations for stippled cells or polychromatophilic cells. The native state of basophilic substance in unaltered blood is unknown but by laking the red cells this substance is artificially aggregated into readily visible masses. In normal human adults these aggregations rarely exceed 1.0% of the total number of erythrocytes but in lead exposed individuals the percentage frequently lies above this normal maximum. Findings of percentages above 1.0% to 1.5% and especially above 2% in persons exposed to lead at once suggest lead absorption and the possibility of approaching lead poisoning. The chief value of this test is as a mark of lead absorption and early lead poisoning. As lead poisoning progresses to extended chronicity, the worth of the procedure diminishes."

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This Industrial Hygiene Section is published to promote sound thought upon and concerning industrial hygiene. To that end it will contain articles, discussions, news items, reports, digests, and other presentations, together with editorial comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

INDUSTRIAL HYGIENE

The Editorial Committee will exercise its best judgment in selecting for publication the material which presents most exactly the factors affecting industrial health and developments for control of potentially injurious exposures. The editors may not concur in opinions expressed by the authors but will endeavor to assure authenticity of fact.

The Science, the Law and the Economics of Industrial Health

Volume 6 | April, 1945 | Section 2

Informing the Worker

MANY textbook dissertations on occupational disease control include the direction that the worker should be informed that he is exposed to the hazard under consideration so that he may observe the proper safeguards. At first glance, this advice appears desirable and almost to go without saying. Labor interests certainly accept the idea as axiomatic. But the employer, and those advising him, often follow up the initial acceptance of a plan which involves informing the worker with a number of misgivings, and come to the conclusion that the less said about any health hazards incident to operations the less trouble will ensue.

Let us review the reasons brought forward to lead to this latter conclusion, examine their cogency, compare them with experiences where the workers have been informed, and, finally, on this broader basis arrive at a more mature viewpoint on this subject. It is to be noted that, with increasing emphasis being placed upon the industrial relations aspect of industrial hygiene, this matter is assuming constantly greater importance.

PROBABLY the first thought that occurs to those charged with the smooth handling of industrial relations is that informing the worker about the health hazards to which he is exposed will cause him to be over-apprehensive, will stimulate him to make compensation claims for occupational disease, and, worst of all under present tight labor markets, will lead him to seek employment elsewhere.

Not only is it alleged that such undesirable results will occur but, in addition, that labor unions will include in subsequent contracts supplementary wage rates to compensate the worker for subjecting himself to conditions which may cause injury to his health. And besides, there is the psychological factor such as occurs after one has just finished reading the home doctor book or the patent medicine ad—we have more symptoms than we had previously known existed.

What has actually been the experience where the worker has been informed concerning the presence of potential health hazards? There is no question but what examples of all of the undesired results referred to have occurred and could be brought forward in support of the contention that the worker should be kept in the dark. It is accordingly in order to point out that there are good and bad methods of handling such a matter, and furthermore that much depends upon the modern concept of quantities of injurious materials as being an all-important fact.

In informing the worker that he is exposed to dust, it is obviously not the thing to do to tell him that he is to be working with dust containing silica and that, if he doesn't wear his respirator, he will get silicosis and die. The proper method involves a discussion of the amounts of dust which may be injurious.

With facilities available today, any plant including exposure to dust with a quartz or other free silica content should know the concentrations of dust in the air at the various operations. In all probability conditions which normally cause continued exposure to sufficiently large amounts of dust to result in silicosis have, for the most part, been brought under control. But it is essential that the cooperation of the worker be enlisted so that he may avoid unnecessary high exposures, or so that he will wear a respirator during certain parts of the operation where the dust may be difficult to control economically.

A recommended procedure in such a case is that the man be told that breathing too much of this dust over five or 10 or more years may affect his breathing capacity, with the development of a condition known as silicosis; that, if he does not breathe unnecessarily large amounts of this dust, he may continue at the job all his life without any effect on his lungs; that management has made very sure that the condition is safe by having dust determinations made which have shown that the average amounts of dust in the air are within safe limits when the job is properly conducted by the worker; that such details as avoiding careless handling of air jets in dusty areas be observed; that certain parts of his operations, which are specified, require wearing a respirator furnished by the employer and approved by the U. S. Bureau of Mines; and that, in addition to routine checks of the amount of dust in the air, the company takes periodic x-rays of the chests of all workers exposed to dust in order to learn whether the

INDUSTRIAL MEDICINE, Industrial Hygiene Supplement: Official Publication of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, J. J. BLOOMFIELD, President; ROBERT A. KEHOE, President-Elect; EDGAR C. BARNES, Secretary; J. B. LITTLEFIELD, Treasurer: Published in January, April, July, and October: Editor, WARREN A. COOK: 605 North Michigan Avenue, Chicago.

individual method of operation might be involving more of a dust exposure than expected and bring this to management's attention for further corrective measures before silicosis actually developed.

Questions should be encouraged, as they permit various misconceptions concerning the effects of dust to be dispelled. A commonly-believed fallacy is that inhalation of dust leads to tuberculosis; another, that a man who enters the stone-cutters' trade will die at the end of 10 or 20 years because his lungs will, by that time, have become filled with stone dust.

The road between unjustified hysteria over an occupational disease hazard and a dangerous indifference to its effects takes the direction of a simple explanation, *with strict adherence to the exact truth in the light of present knowledge.*

Where the worker has been informed concerning the health hazards of his job along some such lines as in the foregoing example, always with emphasis on the fact that it is an excessive exposure which can be quantitatively evaluated that is to be avoided, with variations in approach and in detail to meet the seriousness of the hazard and the level of intelligence and the personality of the worker—when this matter is handled in this manner, what of the validity of the objections which have sometimes been raised by management?

IT HAS been our experience that apprehensiveness has usually been either due to a history of actual cases of occupational disease produced under uncontrolled conditions or has been the result of exaggerated stories with little basis in fact. We have been told by a hard-rock tunnel worker, all in good faith and with the air of letting us in on some inside information, that a friend of his worked for just 10 days on the Gauley Bridge tunnel and breathed so much quartz dust in that time that he forthwith died of silicosis. The best antidote to over-apprehensiveness is a matter-of-fact account of the actual situation.

Claim consciousness among a group of exposed workers may cost the insurance company—and eventually, through increased rates, the employer—greatly more than the anticipated losses. It is consequently something that every good lawyer will advise be not unnecessarily stimulated. Where one has observed a claimant on the witness stand glibly reciting his symptoms as rehearsed from the book, one is likely to conclude that the more the worker is informed the more vulnerable his employer becomes if for any reason at all the worker decides he will institute a claim.

Without suggesting for a moment that the man with a true occupational disease should not be compensated, the inclusion, in the discussion about the potential hazards, of the fact that the employer has complete information on the severity of the exposure at his plant, and on the amounts of the hazardous material required to cause injury to health, together with information concerning the development of any effect on the health of the individual as shown by physical examination, x-rays, blood tests, etc.—the inclusion of this fact tends to discourage any preconceived ideas on the part of some smart worker that, as employment and wages may start to drop, he might look for employment in a plant with a known health hazard, work there for a brief period, and then feign the symptoms of the occupational disease to which he might claim he was exposed.

Today, workers tend to know that certain of the materials with which they are working may cause injury. The reluctance of the employer to give them the straight facts about these encounters almost the same situation as that of the reluctant parent who finds that his 10 or 12 year old child already is well informed on the facts of life but that owing to the source of the information, the facts are grossly distorted.

THE plants where real efforts have been made to control health hazards have had no exceptional difficulties in holding their employees even under the labor shortages of the past several years, although the employees have been completely informed about health hazards. There is probably no material which is more extensively known as an insidious poison than radium, and especially as applied to the dial-painting industry. But even this industry, which has given meticulous attention to reducing exposures to levels below those which are known to cause injury, has had no exceptional difficulties in attracting and holding a far greater number of workers than ever before in its history. All these workers are well informed on the hazards of the radium paint, but they have confidence in the sincerity of their employers to institute proper safeguards for the protection of their health.

And as for the imposition of an additional increment in wage rates for presence of an occupational disease hazard, it would seem that here again the relative exposure of the hazard should be the deciding factor. If a worker is required to handle some very poisonous material, it is to his greater personal interest that money be spent to reduce his exposure to a level where his health will not be injured than that the exposure remain excessive and he receive a higher wage.

It is of interest that in one recent case, failure to obtain and pass along to the labor union competent advice concerning the effect of a material on health resulted in an additional 11 cents on the hourly rate. In this case the labor union contended that the dust from glass wool insulation as it was applied to ships would cause injury to the lungs of the carpenters assigned to this job. The employer considered this was reasonable. After all, didn't everyone know that glass wool dust caused your skin to itch where the tiny fibers became imbedded in the skin? And how much more the delicate, soft lung tissue would be injured! The fact is, of course, that dust from glass wool is not injurious to the lungs—as any competent authority would have informed this employer, the labor union, or the carpenters who were assigned to the job.

IT IS NOT suggested that the worker need be given minute details concerning all the symptoms which each hazardous material may cause. Carbon monoxide produces headaches, but there are many other causes, non-occupational as well. But it is considered desirable that the worker tell his foreman of any symptoms which might be referable to the exposure. The foreman should in turn, inform the plant medical department. It occasionally happens that early symptoms may point to some unexpectedly high exposure and permit its correction before serious injury develops. On the other hand, if an occupational cause for a symptom can be ruled out, then the worker has just that much better opportunity to obtain a correct diagnosis and proper medical treatment.

The present trend is toward informing the worker about the materials he is to encounter and his part in avoiding excessive exposures to them. The industrial concerns which make a practice of so informing their workers are on the increase. And so far as we have been informed, where the quantitative aspects of the exposures are included in the discussion there have been none of the disadvantageous results over which apprehension has so often been expressed.

In fact the desirability of informing the worker about the results of his x-ray findings is also on the increase and has marked advantages, as so ably discussed by DR. L. E. HAMLIN in the March, 1945, INDUSTRIAL MEDICINE. And, as was brought out by DR. HAMLIN, *the informer should himself be well-informed.*

The Safe Use of Solvents for Synthetic Rubbers

LEONARD GREENBURG, M.D.,
Executive Director,
and
SAMUEL MOSKOWITZ, Ph.D.,
Senior Chemist,
Division of Industrial Hygiene,
New York State Department of Labor

THE invasion by Japan of those areas of the Orient which supplied the United States with most of our natural rubber has reduced our imports of this material almost to the vanishing point. Rubber used in this country at present consists of that natural rubber which was part of our stockpile when the war began, the small amount of natural rubber still being imported from Ceylon and South America, the very small amount of guayule and similar rubbers raised in Mexico and the United States, plus reclaimed natural rubber and synthetic rubber now being made in this country.

Five principal types of synthetic rubber are now manufactured and used in the United States:

1. The first to be made in commercial quantities was Neoprene, polymerized chloroprene.

2. The second to appear were the Thiokols. The Thiokols are polymerized condensation products of sodium tetrasulfide and chlorinated compounds such as ethylene dichloride, propylene dichloride, and dichlorethyl ether.

3. Buna S was developed to take the place of natural rubber, especially for the manufacture of rubber tires. Buna S is a co-polymer of butadiene and styrene. This rubber is now being manufactured in quantity approximately equal to the total tonnage of natural crude imported into this country before the war.

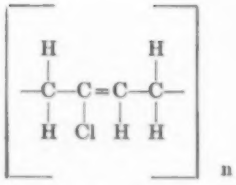
4. Butyl rubber, which is the easiest of all the five synthetic rubbers to prepare, sometimes known as horse-trough or bathtub rubber, is a co-polymer of butadiene and isobutylene.

5. The fifth type of rubber is Buna N, a co-polymer of butadiene and acrylonitrile or vinyl cyanide. Buna N was developed by a number of manufacturers in this country and is often known under such tradenames as Perbunan, Hycar, Chemigum, Thiokol RD, and Ameripol.

The physical and chemical properties of these five types of synthetic rubbers are dissimilar, and hence rubber products may now be made from that particular type of rubber whose properties are most nearly those desired in the final product.

A portion of this paper was presented before the Rubber Section, 32nd National Safety Congress, Chicago.

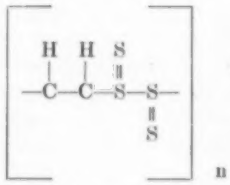
Neoprene



NEOPRENE, which is ——→ is highly resistant to the action of petroleum hydrocarbons. It was first used in the manufacture of hose and fittings designed to come in contact with petroleum oils and certain other solvents which may soften or swell natural rubber but do not affect neoprene to the same extent. It has also been used largely in the form of a cementing material in the manufacture of some of the earlier types of self-sealing gasoline tanks for military and naval airplanes. Neoprene is readily attacked by the aromatic hydrocarbons and many of the chlorinated hydrocarbons. Some of these substances are such good solvents for neoprene that they may be used for the manufacture of neoprene cements. Smaller quantities of solvents, such as acetone, ethyl acetate and other solvents usually found in lacquers (e.g., butyl acetate) are being used in combination with better neoprene solvents in the manufacture of neoprene cements. Also used as solvents are the aromatic petroleum naphthas type I such as Solvesso No. 1, Sovasol No. 73, Union No. 8, and Amsco A. These are essentially mixtures of toluene and petroleum naphtha. The higher boiling aromatic petroleum naphthas which are combinations of xylene with petroleum naphtha may also be used. Cyclohexane and other naphthenes have also been found as constituents of neoprene cements.

Thiokols

GENERALLY speaking the Thiokols are produced by the interaction of sodium tetrasulfide with a chlorinated compound. For example, Thiokol A is produced by the action of sodium tetrasulfide on ethylene dichloride with subsequent polymerization to form:

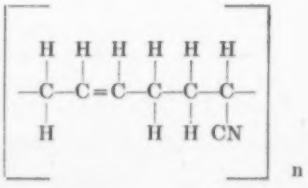


The Thiokols are generally insoluble in most solvents including the aromatic hydrocarbons. Their greatest use arises from this property. Thiokols have been used for the manufacture of gasoline and oil hose, ink rolls for the printing industry and also for the lining of tanks to be used for the storage of solvents.

Special Thiokols with modified properties can be made by proper selection of the chlorinated compound which is to be acted upon by the sodium polysulfide. Thiokols which show solubility have been used with ethylene dichloride and with methyl ethyl ketone as solvents for the lining of jettison gas tanks to be carried by aircraft and also for the building of large, subterranean gasoline storage tanks. These linings resist even the aromatic gasolines of high anti-knock rating which are sometimes used for aviation fuel. We have found a small percentage of chlorbenzene used with ethylene dichloride in Thiokol spreading compounds.

Buna N

BUNA N is a co-polymer of butadiene and acrylonitrile, whose formula is:

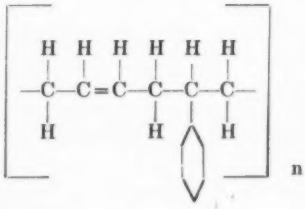


This type of rubber is also highly resistant to aromatic gasolines. It is however, very soluble in methyl ethyl ketone, in ethylene dichloride, and in propylene dichloride. Ce-

ment made by mixing Buna N with one or the other of these solvents are produced and used mainly for the manufacture of self-sealing gasoline tanks and products of similar nature. In the fabrication of self-sealing gasoline tanks one occasionally sees the solvent itself being used to render sheets of Buna N "tacky" so that they may be made to stick together, especially where this is merely the overlap of an edge or the corner of a tank.

Buna S

BUNA S is a co-polymer of butadiene and styrene. Its formula is:

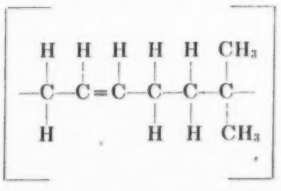


Buna S at present is used chiefly for the manufacture of tires and other objects where the properties most nearly resembling natural rubber yield the desired results.

Until recently, Buna S was little used in solution form since cements formed of this rubber give little bonding strength. However, the use of Buna S in cements has increased more recently. These cements are used where positioning rather than strength of bond is desired, for example in the cementing of linings in shoes.

Butyl Rubber

BUTYL rubber, which is a co-polymer of butadiene and isobutylene, has the following formula:



This rubber requires the least amount of equipment to produce in commercial quantities. However, some of its properties, especially the physical properties, are less desirable than those of the previously enumerated four synthetic rubbers. It is probable that when the war ceases and natural rubber is again available, uses for this rubber will be found which depend more on its excellent impermeability to gases rather than on its physical strength. However, today it can be used as a diluent for natural rubber, and with reclaimed rubber in the manufacture of materials where great tear strength is not required.

Butyl rubber is soluble in petroleum naphtha and, therefore, may be used with this solvent to form spreading compounds which can well be used for coating fabric to produce gas-impermeable cloth.*

Solvents for Synthetic Rubbers

TABLE I lists the solvents which are used most frequently with the synthetic rubbers and the concentrations which, in our opinion, should be the maximum to which any worker should be exposed for the average working day of eight hours. These figures are not necessarily identical with those published elsewhere but they are, we believe, based on the best data available at the present time. The figure given for benzol is somewhat lower than that generally accepted[1] but we have found that this figure for benzol is none too low since intoxication can occur and has occurred when persons are exposed to a benzol concentration even as low as 50 parts per million. On the other hand, the figure for toluene is twice that usually given.[2] This figure is based on a field study made by

*The formulas for the synthetic rubbers given here are merely representative, since there are variations in composition in some of the types as well as in degree of polymerization.

TABLE I.
SOLVENTS USED WITH SYNTHETIC RUBBERS

Solvent	Used With	Suggested Approximate Maximum Permissible Concentration for Prolonged Exposure
Petroleum Naphtha	Buna S, Butyl	1,000 p.p.m.
Benzol	Neoprene	50
Toluol	Neoprene	400
Xylol	Neoprene	200
Trichlorethylene	Neoprene	200
Carbon Tetrachloride	Neoprene	75
Ethylene Dichloride	Thiokols, Buna N	100
Propylene Dichloride	Buna N	100
Methyl Ethyl Ketone	Thiokols, Buna N	500

the New York State Department of Labor in which more than 100 men exposed to toluene vapor were examined and in which the toluene content of the environmental air which they respired was determined by analysis.[3] This study is, we believe, the most complete yet made of the effects of toluene vapor on humans. For carbon tetrachloride, the figure usually cited in the literature is 100 parts per million.[1] However, recent studies by our Department[4] and confirmed by the Division of Occupational Hygiene of the State of Massachusetts[5] indicate that this figure is on the high side. For ethylene dichloride the figure presented of 100 parts per million is that cited by Dr. J. H. Sterner, of the Eastman Kodak Company.[6] Dr. L. R. Daniels, of the Hood Rubber Company of Watertown, Massachusetts, has found that ethylene dichloride vapor in concentrations down to 80 parts per million produces subjective symptoms of intoxication.[7] It is probable that the maximum permissible concentration for ethylene dichloride should be reduced, probably to the same figure given for carbon tetrachloride. There are at present no reliable data with which we are familiar on the maximum permissible concentration of propylene dichloride vapor. However, it is likely that propylene dichloride acts in a manner similar to ethylene dichloride and that the figure for the latter material may, with caution, serve for propylene dichloride.

Too much dependence should not be placed on the use of any of the maximum permissible concentrations for prolonged exposures. Many factors enter into the picture which do not allow for as great a simplification as the use of such figures would indicate. Unfortunately, many of these figures are based on limited data, in some instances only a single set of observations. Many, perhaps even hundreds of observations are required before reliable figures can be set. Moreover, individuals are not all similarly constituted. Where 100 parts per million of benzol, for example, may be safe for some individuals, death may occur with exposures to only 25 parts per million, and at least one such case has been observed. Some individuals may work at a higher rate of energy output at times than others with a consequent increase in rate of respiration. A person breathing at a greater rate than another will absorb a larger amount of atmospheric contaminants in a given period of time. Additional hours of labor and such factors as age, possibly sex, fatigue, indulgence in alcoholic beverages, taking of drugs or medication may all influence the toxic effects which a substance may produce on the human organism.

The problem of mixed solvents also arises and one frequently finds several solvents together in a single preparation, or several solvents being utilized in one workroom, so that employees are subjected to vapors of two or more materials simultaneously. In such cases, it is difficult to evaluate the additive toxic effects of the solvents, and therefore it is difficult to decide what

limits shall be placed on the concentration of each material separately. There is no justification for saying that the toxic concentration of each solvent shall remain stationary in the presence of other solvents. If such a statement were true, one would permit the maximum concentrations of all of the solvents listed in the table to be in the air simultaneously. It is obvious that the presence of additional solvent vapors adds to the discomfort and possibly to the intoxication of the employee.

The best guide to intoxication is, probably, complete medical examinations of the workers at regular intervals. How short those intervals shall be depends on the nature of the solvent employed. With benzol, carbon tetrachloride and possibly ethylene dichloride, hematological and medical studies made as often as once a month are not too frequent. One must be familiar with the earliest signs of intoxication. We have found that macrocytosis, increase in the average size of the red corpuscle of the blood, is one of the most reliable indications of early intoxication for benzol[8] and toluene. Dr. J. H. Foulger, of the Haskell Laboratory, has found that a decrease in blood pressure is a general indication of early intoxication.[9] A valuable procedure is to keep a continuous record of blood counts on each individual and be guided by changes which take place from the established levels for that individual.

In spite of the fact that maximum permissible concentrations for various solvents cannot be used as exact criteria of safe working conditions, they are nevertheless very helpful, especially in the design of ventilation equipment for maintaining safe working conditions.

The problem of protecting workers in industry from solvents used in connection with the synthetic rubbers resolves itself into two fairly separate problems.

The first of these is the problem of protecting the workers from acquiring dermatitis due to the action of the solvent on the skin. In the synthetic rubber industry solvents are not usually used by themselves, but rather in combination with the synthetic rubbers which may and often do contain accelerators, vulcanizing agents, anti-oxidants, fillers, loading materials, etc., present in the form of a cement or spreading compound. The problem of protection from dermatitis due to solvents is then similar to that of protection from the cement or spreading compounds and is largely a question of preventing contact between the substance and the skin of employees susceptible to these materials.

The second problem in connection with the safe use of solvents in the synthetic rubber industry is the prevention of the inhalation of vapors in concentrations sufficient to cause occupational disease, or sufficient to act as mild anaesthetics so that workers are made more prone to accident, or even in concentrations sufficient to be obnoxious to the worker.

PROTECTING THE HEALTH OF THE WORKER—SAFE USE OF SOLVENTS—There are three methods of approach to the problem of protecting the worker against toxic concentrations of solvent vapors. These three methods are commonly used throughout the field of industrial hygiene and have application in the present instance. They are:

1. Substitution of less toxic solvents.
2. General ventilation, i.e., dilution of the general workroom atmosphere with uncontaminated air.
3. Local exhaust ventilation.

Examples of the application of each of these methods will be discussed briefly.

Substitution

THERE is, of course, the possibility of the use of substitutes which are non-toxic or relatively less toxic than solvents now in use. Unfortunately, this technique does not lend itself so readily to the problem of the synthetic rubbers, for as indicated earlier, each of these rubbers is soluble in only a limited number of solvents.

We were involved in the problem of safeguarding the health of some 200 workers engaged in making fuel cells wherein benzol was extensively used as a solvent for neoprene. Fortunately this occurred at a time when toluene was still readily available. We were able to recommend an immediate change to the use of toluene instead of benzol without waiting for the installation of proper ventilation. The problem of the use of benzol with synthetic rubbers now arises only in the use of synthetics soluble only in the aromatic hydrocarbons and when toluene is not available. However, here too it may be possible to find suitable solvents containing no benzol for use with the synthetic rubbers usually requiring aromatic hydrocarbon solvents.

Later models of self-sealing gasoline tanks for aircraft were designed for use with aromatic gasolines containing as much as 40% aromatics. Neoprene could not be used in the cementing of such fuel cells. Buna N under one or another of its trade names then began to be largely used in the manufacture of such fuel cells.

Buna N is soluble in methyl ethyl ketone, ethylene dichloride and propylene dichloride. Methyl ethyl ketone is much less toxic than either of the other two solvents mentioned although its odor is such as to nauseate some employees who inhale its vapors. Once such susceptible persons are removed from the immediate vicinity of methyl ethyl ketone vapors, the remaining employees should have no difficulty with this solvent in concentrations as high as 500 parts per million, whereas ethylene dichloride or propylene dichloride may be troublesome in concentrations as low as 100 parts per million and possibly even lower. It is true that methyl ethyl ketone is more inflammable than ethylene or propylene dichloride. However, each of the other two solvents has a flashpoint below room temperature.

We have seen methyl ethyl ketone used with Buna N in the manufacture of self-sealing tanks with great success. We have, however, been in plants where ethylene dichloride and propylene dichloride are used and on inquiry have learned that these plants would not employ methyl ethyl ketone, even though its toxicity is lower, because it was found that methyl ethyl ketone would not give as satisfactory a cement or was considered too inflammable for use.

The most recent cases we have encountered of the use of benzol in synthetic rubber cements have been in the manufacture of shoes. Until rather recently, natural rubber cements had been used. As the supply of this material dwindled, synthetic rubbers were released for such use: neoprene where strength of bond was required, and Buna S where positioning alone was sufficient. We have found benzol in both types of cements—unnecessarily, since Buna S will dissolve in petroleum naphtha alone, and neoprene can be dissolved in one of the aromatic petroleum naphthas which contain petroleum naphtha and an aromatic hydrocarbon which is less toxic than benzol, that is, either toluene or xylene.

General Ventilation

IN THE fabrication from synthetic rubber of certain large articles, large floor areas and hence large room

Fig. 1.
General ventilation used in cementing operations on self-sealing fuel cells. Air is exhausted through grill in floor shown in foreground. Air inlets not shown

Fig. 2.
General ventilation used in cementing operations on self-sealing fuel cells. Air inlets are shown along ceiling

Fig. 3.
General ventilation used in cementing operations on rubber life rafts. Air is exhausted through grills in floor and admitted through distributors along ceiling

Fig. 4.
General ventilation used in cementing seams on barrage balloons. Large room volume provides for initial dilution of solvent vapor. Mechanical ventilation provides necessary air change

volumes are required. In such cases considerable dilution of vapors may take place so that toxic concentrations are not built up in the workroom air. Dilution due to the large volume of room air which is present may be increased by the use of generalized ventilation in which additional air is brought into the room at the ceiling level and removed through the workroom floor.

TABLE II.
GENERAL VENTILATION REQUIREMENTS

Solvent	Suggested Approximate Maximum Permissible Concentration For Prolonged Exposure	Volume of Air Required for Dilution of Vapor from One Gallon of Solvent so that Concentration of Solvent Vapor is equal to Suggested Maximum Permissible Concentration in Column 2
Petroleum Naphtha (as hexane)	1,000 p.p.m.	25,000 C. F.
Benzol	50	700,000
Toluol	400	75,000
Xylol	200	135,000
Trichlorethylene	200	185,000
Carbon Tetrachloride	75	435,000
Ethylene Dichloride	100	400,000
Propylene Dichloride	100	335,000
Methyl Ethyl Ketone	500	75,000

Table II indicates the quantity of air which must be brought into a room to be provided by existing room volume to dilute a gallon of each of the solvents listed to the maximum permissible concentration in air listed by us (Table I) when that gallon of solvent is completely evaporated. This is, however, predicated on uniform and complete homogeneity of atmospheric concentration of the solvent vapor. This is usually difficult to attain, and vapor concentrations in the vicinity of workers using the solvents are as a rule higher than in areas of low activity. For this reason a larger volume of air than indicated in the table should be used for proper dilution.

There are several practical limitations to the quantity of air which can be used for general ventilation. One of these depends on the heating of workrooms. Air admitted to replace air exhausted from a workroom must be heated in winter weather sufficiently to bring the air from its outdoor temperature to a comfortable working temperature. Since the specific heat of air is approximately 0.25 B.T.U. per cubic foot per degree F, the fuel cost may be considerable if large volumes of air are to be heated Another limitation on total quantity of air brought into a room is that of local drafts. Workers would not be asked to work in areas wherein the air velocity exceeds 200 linear feet per minute, but even lower air velocities may remove heat from the surface of a body too rapidly for comfort. If its relative humidity is sufficiently low, this may occur even if the moving air has reached the temperature of the room air as a whole.

Where relatively non-toxic solvents, such as petroleum naphtha or methyl ethyl ketone are used, it is often possible to use general ventilation in workrooms of fairly large size in maintaining the concentration of vapors at the comfort level. With more toxic solvents, local exhaust ventilation is clearly indicated.

Figs. 1, 2, 3 and 4 illustrate the use of general ventilation in the cementing of large objects. The solvents used in all these operations were those of low toxicity.

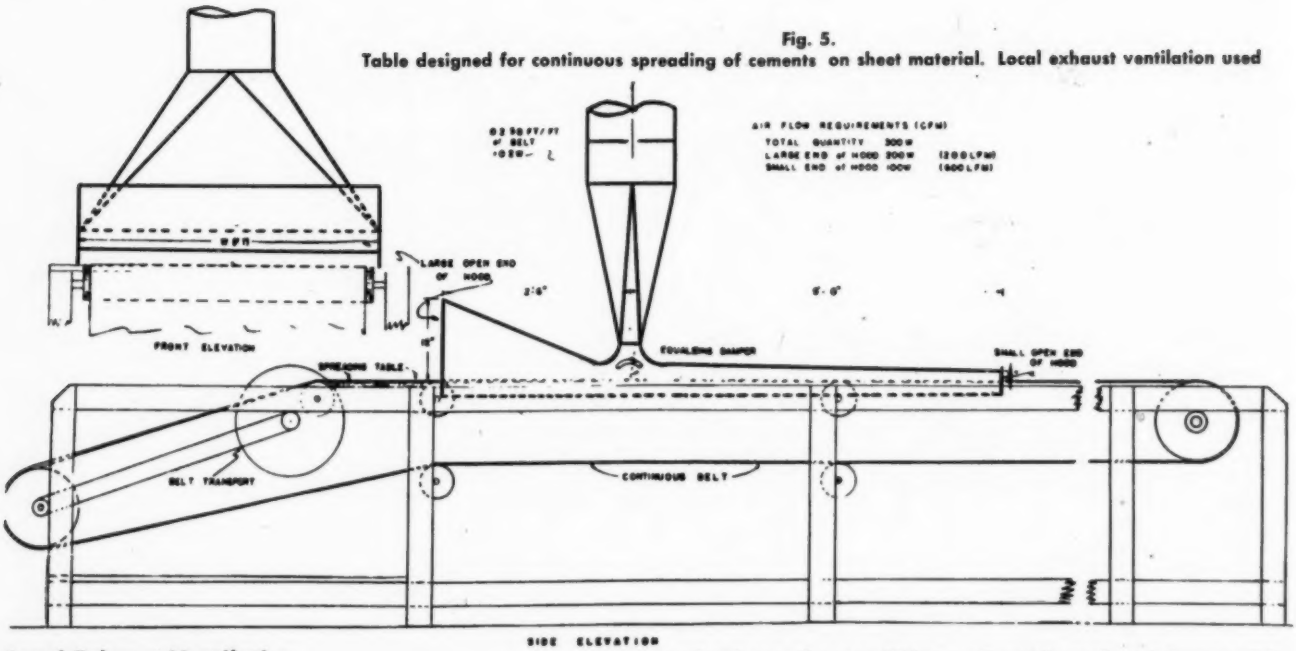


Fig. 5.
Table designed for continuous spreading of cements on sheet material. Local exhaust ventilation used

Local Exhaust Ventilation

THE technique most frequently employed by the industrial hygienist for the control of toxic solvent vapors is local exhaust ventilation. This technique is clearly indicated where vapors are toxic in nature and where the conditions of work make it impossible to achieve control by a simpler means.

Fig. 5 illustrates a spreading table which we helped design and test and which was found satisfactory for use with toluene-containing cements to be brushed on

Fig. 6.
Table used for spreading cements on sheet material. Air is exhausted through grilled slot around periphery of table. Note use of self-closing cement can

flat sheets. Using this spreading table with a neoprene adhesive containing toluene as the solvent, the concentration of toluene vapor in the breathing zones of the workers was found to be 30 to 35 parts per million. With the exhaust ventilation cut off, the concentration rose to 180 to 240 parts per million. Similar operation using benzol-containing cement and no local exhaust ventilation produced concentrations up to 700 parts per million.[10]

Fig. 6 shows a table used by one of the plants of the U. S. Rubber Company for this type of work. A similar table was illustrated in a report by Thomas and Tebbins.[11] The essential differences in the table illustrated here and that described by Thomas and Tebbins is that the one illustrated in this paper employs a wider slot with lower entrance velocity and a grill covering the slot to prevent the entrance of small pieces of sheet material into the exhause system. The volume of air used was approximately 100 C.F.M. per linear foot of table perimeter.

We do not desire to discuss the subject of the design of local exhaust ventilation extensively since this subject has been amply covered elsewhere.[12] Fig. 7 shows the design of a hood which we have found adequate for the ventilation of cementing operations on large objects where moderately toxic solvents are employed. The indicated face velocity at this hood would not be sufficient to protect workers if a highly toxic solvent were being used. In such installations it is advisable to provide a turntable to support the object upon which

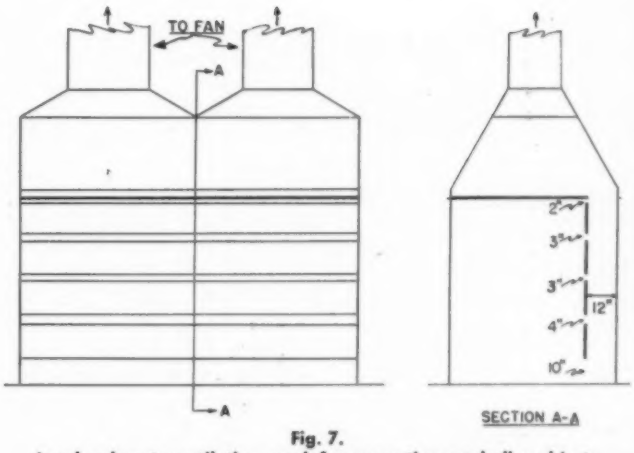


Fig. 7.
Local exhaust ventilation used for cementing on bulky objects

the cement is being spread so as to make it possible for the worker to remain on the upwind side of the object.

Because of the large volume of solvent being evaporated, spreading or coating operations should use local exhaust ventilation (Fig. 8) even when solvents of low toxicity are employed. Sufficient air should be exhausted to lower the concentration of solvent vapor under the hood and within the ducts to a point no higher than 25% of the lower exposive limit of the particular vapor being controlled. The openings in the hood should be so arranged that the entering velocity

Fig. 8.
Spreader showing local exhaust ventilation system. Side openings, usually kept closed, are provided for ready access to interior

will maintain the vapor in working areas at safe concentrations. Additional openings at the sides may be provided for emergency repairs, but these should be kept closed during normal operation.

Another factor which should be considered in the handling of solvents or cements containing solvents is the use of storage and work containers which present as small a surface area as possible from which evaporation may occur. The use of uncovered containers permit evaporation to occur from the entire top surface of the cement or solvent in such containers. It is not difficult to use containers which present less surface from which evaporation can occur, or to use containers which are self-closing and, therefore, do not permit evaporation to occur except when they are in actual use. Such containers include those in which the top opening is only large enough for the brush to enter, or those with a similar opening on the side of the receptacle.

Fig. 6 also illustrates the use of a self-closing cement can which was designed by E. C. Shedd, safety supervisor of the United States Rubber Company's Naugatuck, Connecticut, Footwear plant.

Brushes used for hand spreading operations should be provided with a hook so that they may be hung into a completely closed, preferably self-closing, container when not in actual use. This will help preserve the brush and also minimize the evaporation of solvent from the brush into the air.

Summary

THE decreased supply of natural rubber and the manufacture of certain war materials has necessitated the use of synthetic rubber cements produced by dissolving these rubbers in organic solvents.

Industrial intoxication from solvents used with synthetic rubbers can be avoided by substituting solvents of lower toxicity for those of greater toxicity whenever possible, the use of general ventilation with solvents of low or moderate toxicity, or the use of local exhaust ventilation with solvents of greater toxicity or whenever solvents are evaporated in such quantity that general ventilation does not suffice to control the hazard.

While maximum permissible concentrations are useful guides in the design of ventilation for the removal of solvent vapors, they are not complete substitutes for periodic medical examination of workers, especially where the more toxic solvents are employed.

[We desire to express our thanks to the United States Rubber Company for the photographs used in this paper.]

Bibliography

1. BOWDITCH, M., DRINKER, C. K., DRINKER, P., HAGGARD, H. H., and HAMILTON, A.: Code for safe concentrations of certain common toxic substances used in industry. *J. Ind. Hyg. & Toxicol.*, 22, 251, (1940). American Standards Association: Allowable concentration of benzene. American Standard Z 37.4-1941; January 15, 1941.

2. VON OETTINGEN, W. F., NEAL, P. A., and DONAHUE, D. D.: The toxicity and potential dangers of toluene. *J. A. M. A.*, 118, 579 (1942). ——— et al: The toxicity and potential dangers of toluene, with special reference to its maximal permissible concentration. *Public Health Bulletin No. 279* (1942).

3. GREENBERG, L., MAYERS, M. R., HEIMANN, H., and MOSKOWITZ, S.: The effects of exposure to toluene in industry. *J. A. M. A.*, 118, 573 (1942).

4. HEIMANN, H., and FORD, C. B.: Low concentrations of carbon tetrachloride capable of causing mild narcosis. *New York State Ind. Bull.*, 20, 209 (1941).

5. ELKINS, H. B.: Maximal allowable concentrations. I. Carbon tetrachloride. *J. Ind. Hyg. & Toxicol.*, 24, 233 (1942).

6. STERNER, J. H.: Determining margins of safety: Criteria for defining a harmful exposure. *Industrial Medicine*, 12, 514 (1943).

7. Personal communication.

8. GREENBURG, L., MAYERS, M. R., GOLDWATER, L., and SMITH, A. R.: Benzene (benzol) poisoning in the rotogravure printing industry in New York City. *J. Ind. Hyg. & Toxicol.*, 21, 395 (1939).

9. FOULGER, J. H.: Medical control of industrial exposure to toxic chemicals. *Industrial Medicine*, 12, 214 (1943).

10. MOSKOWITZ, S.: Less toxic substitutes for materials in industrial use. *New York State Ind. Bull.*, 21, 115 (1942).

11. THOMAS, T. R., and TEBBINS, B. D.: Control of solvent exposures in the rubber industry. *Industrial Medicine*, 12, 255 (1943).

12. American Standards Association: Fundamentals relating to the design and operation of exhaust systems, 1936. DALLAVALLE, J. M.: Principles of exhaust hood design. U. S. Public Health Service, 1939.

A Modified Beaded Column

—For Absorbing Gases and Mists—

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IN THE collection and estimation of the common gases and mists encountered in plant atmosphere this Bureau has usually utilized the well known and accepted methods. From time to time, however, a need has arisen for a more convenient yet efficient apparatus for this type of work. The main requisites for such an apparatus are that it be portable, simple to operate with existing facilities in the field, utilizes small quantities of absorbing solution and in efficiency be as good as existing devices.

Such a need has been stimulated by two factors: (a) the remoteness of many plants from the central laboratory where the transport of large fragile equipment becomes difficult and discourages good sampling; and (b) a desire for facilities for taking many samples of any gas or of different gases at any time unforseen field work may demand it. Offsetting this need is the midget impinger but its efficiency for collecting gases is limited.

To expedite a study where conditions exist such as described above, a modified beaded column has been devised which is constructed out of ordinary glassware and utilizes only 5 ml of absorbing solution.

Our interest in such a type of apparatus has been centered in the absorption of HCL mist which we have had to sample much more frequently than other gases. The design of the apparatus as first used in the field is shown in Fig. 1. In a sense it combines the efficiency of the midget impinger with that of a short beaded column. The incoming gas is subjected to an initial spray in the bulb, followed by a more thorough scrubbing as it ascends through the column. The sampling rate employed is 2 liters per minute.

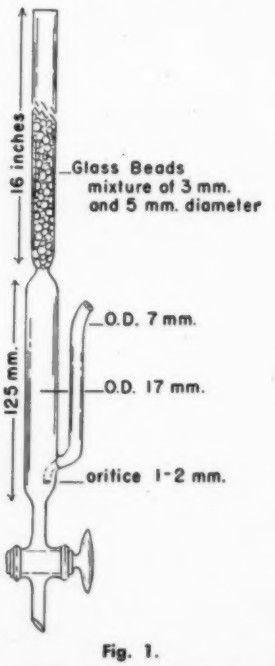

Fig. 1.

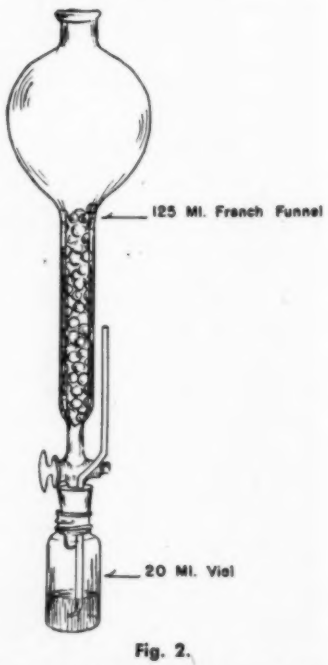

Fig. 2.

Later it was observed that the column need not be as long as described and that even this apparatus

could be made simpler by substituting a 125 ml French type funnel for the beaded column and a small 20 ml vial for the bulb. The inlet tube was made from a short piece of glass tubing and mounted on the funnel by means of a two-hole rubber stopper.

In operation, the stopcock is closed and the stem of the funnel filled with absorbing solution which is then run into the vial by detaching the latter slightly from the rubber stopper. The stopcock is allowed to remain open, the vial affixed firmly, and the apparatus is ready for sampling. Using the Willson pump with a definite setting on the bleeder and a flowmeter, a rate of 2 liters per minute is easily maintained. After sampling, the column is washed down with distilled water until the bottle is full. The same precautions in washing must be observed as indicated above for allowing the liquid to run into the vial.

A few preliminary tests served to show that if the apparatus is used at a rate of flow of 2 liters per minute, only 5-6 ml of absorbing solution is ample.

TABLE I.
HYDROCHLORIC ACID

Sampling Period Minutes	M1 .01 N NaOH			HCl found in PPM		
	Column	Bubbler	Impinger	Column	Bubbler	Impinger
10	1.5	1.45	.65	18.3	17.75	16.0
15	4.6	4.3	14.5	36.8	34.8	33.5
10	5.7	5.3	7.7	71.1	66.2	69.7
5	3.05	2.8	3.55	73.7	67.5	61.0
5	3.4	3.3	4.2	85.7	83.6	77.0
5	3.95	4.1		95.1	98.5	
4	5.0	5.5		150.7	167.5	
5	9.7	9.0		234.0	230.0	
13	27.0	27.0		301.0	301.0	
5	25.5	27.3	36.0	640.0	685.0	648.0

TABLE II.
SULFUR DIOXIDE

Sampling period Minutes	M1 .0095 N Iodine		SO_2 found in PPM	
	Column	Bubbler	Column	Bubbler
17	6.39	7.3	21.6	24.7
10	7.43	7.33	42.67	42.0
16	12.77	12.8	46.3	46.4
12	12.2	11.0	58.8	53.2
13	19.4	17.4	86.5	77.6
14	18.87	23.0	78.1	95.3
15	34.7	33.35	133.6	128.2

TABLE III.
AMMONIA

Sampling period Minutes	M1 .1 N NaOH		NH_3 found in PPM	
	Column	Bubbler	Column	Bubbler
5	22.7	22.1	98.5	118.5
13	22.0	21.9	159.0	168.0
10	16.4	16.2	864.0	888.0
10	8.2	7.9	1191.0	1945.0
10	12.2	13.3	1400.0	1325.0

TABLES IV (A) AND (B).
CHLORINE

Sampling period Minutes	M1 .01 N $AgNO_3$		Cl_2 found in PPM	
	Column	Bubbler	Column	Bubbler
15	9.2	8.5	74.6	70.0
15	15.7	13.0	124.0	107.0
11	22.0	20.0	244.0	224.0
Sampling period Minutes	M1 .01 N Thio.		Cl_2 found in PPM	
	Column	Bubbler	Column	Bubbler
10	1.5	1.5	13.0	13.0
5	10.3	9.7	178.0	168.0
8	20.6	19.7	223.0	213.0

Tables I to IV show the results obtained by simultaneous collections at 2 liters per minute using the beaded column and a fritted glass bubbler with artificially created atmospheres of various gases. The results, therefore, are on a comparative basis with those

of the bubbler. In the case of HCL a similar apparatus was mounted on a midget impinger as shown in the photograph, and a few samples taken simultaneously with the above set-up. At the increased rate of flow of the midget impinger about 1 ml more of absorbing solution had to be used. The results, however, were good in view of the versatility afforded by this means of sampling.

A brief description of the absorbing solution used and the method of analysis for the gases tried is as follows:

Hydrochloric acid:	Absorbing solution—Water Method of analysis—Titration
Sulfur dioxide:	Absorbing solution—5% NaOH Method of analysis—Iodimetric
Ammonia:	Absorbing solution—.5 N H_2SO_4 Method of analysis—Titration
Chlorine:	Absorbing solution—(a) 1% Na_2AsO_3 in 5% NaOH Method of analysis—Volhard
	Absorbing solution—(b) 5% KI Method of analysis—Titration liberated I_2

The results of the tests conducted in the laboratory show that the beaded column compares very favorably with the fritted glass bubbler for the gases tried. The compactness of the assembly makes it quite portable and the small amount of absorbing solution required makes it possible to obtain a very large number of samples while in the field.

Health Hazards in Some Non-Ferrous Metal Smelters

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SINCE the beginning of the war the demand for copper, lead and zinc has markedly increased. To meet these demands the smelting industry has made many metallurgical improvements in the treatment of low grade metal deposits and has greatly increased production. Because of the importance of the products produced, the smelting industry commands an important place among the industries of this country.

It is an established fact that the health of workers is an important factor in maintaining peak production. In an

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effort to meet production quotas many industries may overlook factors of health and safety with the result that production may actually decrease. While it is of great importance to produce large quantities of metals, it is also important that they be produced in the safest possible way.

The purpose of this paper is to consider briefly the health hazards associated with the smelting and refining of copper, lead and zinc, with the production of certain smelter by-products and with plants sometimes operated in conjunction with smelters. Only the treatment of sulfide type ores will be considered. Because of variations in the nature of non-ferrous metal ores and of smelting and refining processes, a complete discussion and analysis of all of the health hazards in the smelting industry would be beyond the scope of this paper.

Non-Ferrous Metal Ores

THE ores shipped to smelters vary widely and thus the smelting and refining processes also vary. The ores received usually contain small amounts of metals in addition to the primary metal and they become valuable products as the smelting and refining process proceeds. Copper ores may contain nickel, gold, silver, platinum, antimony, lead, zinc and arsenic and since all of these metals are not usually refined at any one plant, concentrates containing one or more metals are shipped to other plants for additional treatment. Small amounts of toxic metals in an ore usually become important from the standpoint of causing health hazards after the ore is concentrated and handled in the processes of roasting, smelting or refining. Quartz is the prominent gangue material in ores of copper, lead, and zinc, and silica dust is usually the chief hazard encountered in the primary treatment of ore at the smelter.

Description of Processes

IT IS NOT the purpose of this discussion to give a technical description of the smelting and refining of non-ferrous metals, but rather to discuss processes and procedures in general as possible sources of harmful dusts, fumes, mists, vapors or gases. Emphasis will be placed on the health hazards which may result from smelting and refining rather than on the metallurgy and technical features of the processes.

Briefly, the smelting and refining of ores consists of receiving ore in railroad cars from mines, dumping or unloading the cars, crushing and sampling the ores, concentrating by flotation, roasting, smelting, refining and casting. The ore smelting equipment is usually connected to a flue and stack where valuable by-products are trapped. Flue dusts may then be treated for the recovery of valuable products or be shipped to other smelters for treatment. In addition to having maintenance departments, certain smelters may operate a lime quarry to supply flux, a brick plant to supply furnace lining and a foundry to supply castings.

Ore Unloading

ORE arriving at the smelter is usually received in open swing-bottom railroad cars. Depending upon the condition of the ore, pounding of the cars or even shoveling may be necessary before all of the ore is released. Compressed air is sometimes used not only to loosen the bulk of the ore but also to clean the car thoroughly. Instead of using compressed air for cleaning, workmen may sweep the bottom of the car and undercarriage to remove any remaining ore. Ore or dust which may accumulate on the bin platform is either cleaned by sweeping or by the use of compressed air.

Ore cars may also be unloaded with equipment which inverts the car over a bin. When this procedure is used, further cleaning of the cars is not necessary unless the ore is damp or frozen and clings to the car. High grade ore and concentrates may be received in box or flat-bottom open cars and are usually unloaded by shoveling, although mechanical devices may be employed.

Crushing, Grinding and Sampling

ORE from the storage bins may dump directly to conveyor belts which transport it to crushers, screens and sample mills and finally after being reduced to the desired size, it is delivered to other storage bins. Jaw and gyratory crushers are used for primary breaking, and secondary crushers and rolls for finer crushing. In the absence of control, silica dust will originate at crushing, grinding and screening equipment and at points where ore may fall from one level to another.

Sampling mills serve as a means of diverting a representative portion of the total ore to a sample which is crushed and ground and further divided with the rejected portions rejoining the ore and the final sample riffled, bucked and ground for assaying. Sampling mills may have automatic equipment for taking and crushing the sample. In such cases, the final weight of the sample is small and preparation is accomplished by fine grinding and bucking. Other sample mills may take a large sample which is mixed and cut down by shoveling, followed by crushing, fine grinding, and riffling. After each batch of ore has been run, the mill equipment is cleaned, frequently by the use of compressed air jets.

Sample preparation rooms are often dusty since fine grinding is done in these rooms and the use of compressed air for cleaning equipment may be common practice.

Concentration

CONCENTRATION serves to separate the constituent minerals of the ore into one or more products and eliminate gangue or waste materials. Separation may be accomplished by flotation, jigs or gravity tables, or leaching. Crushed ore from the storage bins passes to roll crushers, rod or ball mills and then to the concentration process. Final grinding of the ore is usually done wet, resulting in good dust control. Wherever separation is made by flotation, concentrates are filtered and are ready for roasting.

Roasting

THE purpose of roasting is to reduce the sulfur content of the ore and to remove such volatile components as arsenic, antimony, and cadmium and to convert the bulk of the ore to oxides and sulfates. The volatile components of the ore are condensed and collected in the flue system, and in bag houses or electrical precipitating systems. The sulfur dioxide produced may be recovered for making sulfur or sulfuric acid or expelled into the atmosphere through the stack.

The roasting of copper ores may be accomplished in roasting furnaces or simultaneously with smelting. Preliminary roasting is frequently done in multiple-hearth furnaces having revolving arms which continually stir the ore. The charge is conveyed to the top of the furnace, is fed on the upper hearth and passes from the outer edge of the hearth to the center where it falls through drop-holes to the hearth below. On this hearth, the ore is raked to the outer edge where it falls through to the next hearth. The charge follows a zig-zag pattern through the furnace and finally drops into storage bins or cars beneath the furnace. It is usually necessary to clean the furnace doors, drop-holes and arms periodically which is a hand operation and may be dusty. Some leakage of fume from roasting furnaces may be observed during normal operation. Gases and volatile constituents of the ore are discharged to the flue system.

In treating lead ores, preliminary roasting may be accomplished in furnaces similar to those used for copper ores or the complete roasting may be done in sintering furnaces. In other cases, the calcine from regular roasting furnaces may be further desulfurized in sintering furnaces. A common furnace of this type is the Dwight and Lloyd sintering machine which feeds the material in an even layer on an apron or system of grates to which continuous suction is supplied. The apron moves continuously and the reaction is started at the feed end of the apron and as the burning progresses, the sulfur content of the charge is reduced. The cake is chilled before the melting temperature is reached and the cake is discharged to bins at the end of the apron. High sulfur ores may have to be run through the sintering process a second time. Draft for burning the charge is supplied by a fan connected to a suction box below the grate system and fine particles

from the sinter charge accumulate in bins below the grates which are cleaned periodically. The fumes and gases produced in this furnace are discharged to the flue system.

Roasting of zinc ores may also be done in the same type of furnace used for roasting copper ores. In such cases, the operations are conducted in essentially the same manner as in copper roasting.

After roasting furnaces have been used for an indefinite period of time, it is necessary to repair or rebuild the hearths and furnace walls. In case the furnace lining is removed, workmen break the walls and hearths with jackhammers and throw the waste brick by hand through doors to the furnace floors. The waste brick are then loaded to wheelbarrows and dumped into cars. Through continued use of roasting furnaces, the brick lining becomes coated with arsenic trioxide which presents a hazard to the workmen doing repair or relining work.

Copper Reverberatory Furnace

THE reverberatory furnace is built of refractory brick, is fired at one end and the flues are located at the opposite end and are connected to the flue and stack system. The charge is commonly dropped from cars of various types into charging ports located at the top or sides of the furnace. Skimming doors and tapholes may be located at any point along the walls of the furnaces depending on plant layout.

The reverberatory furnace charge will vary but in addition to roaster calcine or concentrates, it may also consist of collected dust and fume, ladle skulls, refinery slag, fluxes and precipitated copper. Materials charged in the dry state, particularly calcines and flue dust and fume, may result in the loss of valuable products as well as excessive dust exposures. The reverberatory furnace matte is tapped to ladles, or to launders which empty into ladles. The matte in a molten condition gives off fume which may consist of oxides of arsenic, antimony, lead and other toxic metals. During melting of the charge, slag rises to the top and is tapped at a convenient place around the furnace. When it becomes necessary to rebuild a reverberatory furnace, the old brick structure is broken down and the brick removed. Since these brick may also be contaminated with arsenic trioxide, an arsenic hazard may result. Leakage of gas and fume from the furnace may occur at the charging ports or from breaks or openings in the furnace.

Copper Converters

THE purpose of treating copper matte in the converter is to oxidize the iron and sulfur by blowing air through the molten matte. Sulfur is liberated as is sulfur dioxide and the iron is oxidized and goes to slag and copper sulfide is oxidized to produce metallic copper.

The molten copper matte from the reverberatory furnace is dumped from ladles usually by overhead cranes into the converter. Cold ladle skulls and flux may also be added from ladles or boats. After the addition of the charge, the converter is turned to such a position that the converter opening is under a hood for collecting fumes. The charge is then blown with air until a slag forms which is removed and returned to the reverberatory furnace for copper recovery. When slag or blister copper is being removed or when the converter is otherwise in a tilted position, fumes are liberated to the building. After the formation of blister copper in the converter, the metal is poured into ladles and then to refining furnaces.

During the process of converting, considerable sulfur dioxide and small quantities of metal fumes (arsenic, antimony, zinc, etc.) may be liberated. Gases and fumes escaping the hood will be discharged to the converter building during this time.

Copper Purification and Casting

BLISTER copper from the converters is charged into refining furnaces and blown with compressed air. During this process, metal impurities are oxidized and escape as fume. The slag formed is skimmed and copper oxide formed during the process is reduced to metallic copper by thrusting wooden poles into the bath of metal. If this copper is to be further purified by electrolyzing, it is poured into anode shapes in a casting machine.

The anodes refined by the electrolytic method are lowered by means of overhead cranes into tanks containing sulfuric acid electrolyte and the copper deposited on thin copper cathode sheets. Metallic impurities collect in the bottom of the tanks as muck or slime which is given further treatment for recovery of valuable metals. After the cathode deposit has reached the proper thickness, the copper is stripped from the starting sheets and melted, fire refined and cast into desired shapes. Scrap anodes are melted in an anode furnace and recast.

Lead Blast Furnace

ROASTED or sintered ore along with suitable preparations of fuel and fluxes make up the charge for the lead blast furnace. The calcine or sintered product may be transported in larry cars to a weighing station where the charge is prepared and is later dumped into the top of the furnace from a car designed for that purpose. The reaction in the furnace produces three different products; that is, lead, slag and spiess which have different specific gravities and are easily separated. The spiess contains zinc, copper and other base metals and is further refined for zinc recovery. The slag is discarded and the lead containing small quantities of various metals is tapped from the furnace to ladles and transported to dross kettles. Loading and unloading sinter and preparing the blast furnace charge may be dusty operations. Metallic fumes may be liberated during blast furnace charging and tapping operations.

Lead Dross Kettles

LEAD from the blast furnace is dumped from ladles into large drossing kettles where it is freed of impurities. Various materials are added to the lead which is stirred by mechanical means until the impurities rise to the surface as dross. The dross contains copper, sulfur, arsenic, antimony, zinc and iron and is skimmed off by means of a large suspended perforated spoon. The dross may be treated in a reverberatory furnace for separation of lead from the copper and other metals. The lead is returned to the drossing kettles and the copper matte is sent to a copper smelter for further treatment. After drossing, the lead bullion is treated with metallic zinc which collects the gold and silver in a zinc dross. The desilverized bullion is then further refined for the removal of zinc.

The refined lead is pumped or siphoned to a casting machine. The lead pigs are taken from the casting machines and stacked in railroad cars for shipment.

Zinc Leaching and Electrolyzing

WHILE there are a number of metallurgical processes used for the recovery of zinc, only the electrolytic process and the operations associated with it will be considered in this discussion.

Zinc calcine from the roasting furnaces contains zinc oxide and sulfate which are soluble in sulfuric acid. Lead and certain other metals are insoluble and comprise a residue in a sulfuric acid treatment. The handling of calcine in the dry state, and particularly loading, unloading, and screening, may prove to be dusty.

In practice, the zinc calcine may be taken from the roasters or storage bins and conveyed, or transported in open cars to the leaching plant. The calcine may then be screened and the oversize crushed and returned for further roasting. The screened calcine is then fed to sulfuric acid leaching tanks where the zinc is dissolved. The resulting neutral solution is thickened and finally filtered to remove the residue. The residue contains lead and may be dried in rotary drying kilns and loaded to railroad cars. This residue may be treated further or shipped to a lead smelter. The drying and loading of zinc residue may prove to be dusty in the absence of adequate control.

When the zinc is dissolved in sulfuric acid, certain other metals present in the calcine are also taken into the solution. These impurities are precipitated by agitation of the solution with zinc dust. Should the zinc solution be slightly acid during this treatment, it is possible that arsine gas

will be produced through the combination of hydrogen and arsenic which may be present. The solution from the purifying tanks is filtered and the filter cake treated for recovery of valuable products or shipped to other plants for treatment.

After purification is complete, the zinc sulfate solution is delivered to electrolytic cells for precipitation of zinc. The cell anodes are lead and the cathodes aluminum. After the desired thickness of zinc has accumulated on the cathodes, they are lifted from the cells by means of chain blocks and the zinc deposit stripped from the aluminum cathode by means of a heavy knife. The zinc sheets are piled on small cars and transferred to melting furnaces.

During the electrolyzing of zinc, gas is evolved from the cells which forms a sulfuric acid mist or spray. This acid mist is very irritating to the nose, throat and upper respiratory passages of workmen.

Melting and Casting

THE cathode sheets from the electrolytic cells are placed in a reverberatory smelting furnace. During the melting period, a dross forms on the surface of the metal which is skimmed into small cars or wheelbarrows and transported to revolving drums where molten zinc is removed from the dross. Casting of the metallic zinc is done from ladles into iron molds. The cooled zinc slabs are piled in railroad cars for shipping.

Zinc dust for use in purifying zinc sulfate solution may be made in the casting department. This is done by blowing compressed air through a stream of molten zinc and the dust is collected in a chamber.

By-Products

CADMIUM. The principal sources of cadmium as a by-product of smelters is from cadmium-bearing lead blast furnace fume, and from residue from the purification of zinc sulfate solution preliminary to the electrodeposition of zinc. In the recovery of cadmium, the products are first treated with strong sulfuric acid followed by neutralization with hydrated lime and filtration. The filtrate is then delivered to electrolytic cells and the cadmium deposited on aluminum cathodes. The cadmium sheets are melted and poured into various marketable forms.

ARSENIC. The flue dusts from various roasting and smelting processes are usually rich in arsenic and are collected from the flue system, electric precipitator units and bag houses. The production of white arsenic is often carried out in two stages; namely, the production of crude arsenic followed by refining of the crude. Flue dust collected at precipitator units or bag houses is removed, after an appreciable quantity has accumulated, and transported to arsenic roasters. Dust from the flue proper is also delivered to the roaster although frequent flue cleaning is not always necessary.

Flue dust removed at the precipitator falls into hoppers where it is drawn off into open cars which may vary in size. Compressed air may be used to aid the flow of dust from the hoppers. The tops of the cars may be sprayed with water, to reduce loss of dust during transportation. At these loading stations, considerable flue dust may accumulate on the floor necessitating periodic cleanup. Bag house dusts may also be collected in hoppers or on the floor under the bags. In the latter case, dust removal may be accomplished by shoveling into wheelbarrows and dumping to open cars. Either method of loading may prove to be dusty in the absence of engineering control.

The flue dust is dumped from the cars to hoppers and fed into roasting furnaces. The arsenic is volatilized in these furnaces and passes through condensing chambers and finally accumulates in hoppers below the chambers. Residue from these furnaces is returned to one of the roasting or smelting processes and the waste gases and fumes are discharged to the flue system. In some plants, crude arsenic suitable for certain commercial uses is shipped without further treatment.

The crude arsenic is withdrawn from the hoppers into open or closed cars and transported to the arsenic refinery. The cars are dumped into hoppers and the crude arsenic fed into refining furnaces. The volatilized arsenic passes through a series of large brick rooms or kitchens where it condenses and the waste gases and any remaining fumes enter the flue system. The arsenic condensing in the first kitchen usually contains impurities and is returned to the arsenic roasters. After sufficient white arsenic has accumulated, the kitchens are opened and the arsenic loaded into wheelbarrows and dumped into a hopper. It is drawn from the hopper, ground and screened, and either packed in barrels or bulk loaded into railroad cars.

SULFURIC ACID. While sulfuric acid is not truly a by-product of smelters, it is sometimes produced from sulfur dioxide which is a by-product of roasting, sintering and smelting operations. Likewise, iron sulfide may be recovered from certain ores and used as a source of sulfur dioxide. The sulfuric acid may be produced either by the contact or chamber methods.

Miscellaneous Operations

FOUNDRY. To meet the need for replacement parts for equipment and iron balls for grinding mills, smelters sometimes maintain a foundry. While iron balls may be poured in permanent molds, most of the castings must be poured in sand molds. In such cases, the methods used will not vary materially from the usual iron or brass foundry practice. The foundry operations will consist of pattern and core making, sand conditioning, molding, pouring, shakeout and casting cleaning. Where only rough castings are made, sand blasting as a cleaning method may not be used.

BRICK MANUFACTURE. Smelters use large quantities of brick of various sizes and shapes for roaster, blast and reverberatory furnace and copper converter linings; for this reason, certain smelters may maintain a brick plant. The operations involved in such a plant will involve quarrying, crushing, grinding, and mixing the rock, brick molding, drying, setting the brick in a kiln, burning or firing the brick and unloading the kiln.

ORE SAMPLE PREPARATION. The sampling of ore was mentioned above but the procedure followed in preparing these samples for assay was not discussed. After a representative ore sample has been collected, it is passed through a preliminary grinder, bucked and then ground to pass a fine screen. Samples are packaged in small envelopes and sent to the assay laboratory. The grinding mills are cleaned after each sample and compressed air is frequently used for this purpose. Samples of concentrates and other materials are handled in a similar fashion although wet materials are dried prior to grinding. Sample preparation rooms are given particular mention here since these rooms can become very dusty unless attention is given to preventive measures.

MAINTENANCE. Workers in maintenance departments may be required to work in one or all of the operating departments of a smelter over a period of time. The work of some may be mostly outside, while others may be required to enter places not ordinarily visited by regular department employees. Repairs may be needed in confined places or even inside of equipment. For this reason, this group of workers may be exposed to a large variety of toxic materials. Since the length and severity of their exposures will vary, the health hazards of maintenance workers should not be disregarded.

CHEMICAL LABORATORY. Smelters maintain chemical laboratories which perform a large number and variety of assays. The use of large quantities of chemicals in such laboratories necessitates well ventilated work rooms.

Health Hazards

DUSTS. The most important factors in the development of silicosis through exposure to dusts are composition (quartz content of the dust), size distribution of the dust particles and concentration of the dust in the workroom atmosphere. Since quartz is the most common gangue material associated with non-ferrous metal ores, dust hazards may arise during unloading, crushing, grinding, screening, sampling or in otherwise handling the ores prior to flotation. The use of compressed air in unloading and in cleaning grinding equipment increases the dust hazard as will the falling of fine dry ore from one level

to another in the crushing and conveying system. Dust hazards may occur in ore sample preparation rooms through handling and grinding of samples and cleaning grinding equipment. When equipment cleaning is done with compressed air, more dust will be produced.

Dust hazards may also occur in connection with roasting and smelting operations, and calcine loading, unloading and screening. However, flotation removes most of the silica from the ore with the result that the dust hazard is of less importance than other hazards. At the roasting stage of the process, the dusts may contain toxic metals and constitute a different type of hazard.

Foundries and brick plants operated in conjunction with smelters present possible dust hazards. The principal dust-producing operations in foundries are molding, shake-out, casting cleaning and sand conditioning. Shake-out and casting cleaning may be particularly dusty unless precautions are taken. In brick plants, fine grinding and screening of dry ore will be particularly dusty and these operations will contaminate other operations which may be located nearby. Ore crushing, kiln loading and unloading may also be dusty.

LEAD. The inhalation of lead dust or fume by workers may result in lead poisoning and for this reason lead hazards associated with many smelting processes are important.

While exposures to lead will result from crushing and grinding of lead ores, whether or not these operations will cause lead hazards will depend on the lead content and nature of the ores. However, if the dust hazards associated with these operations are controlled by engineering methods, the lead hazard will also be controlled.

The possibility of harmful exposures to lead in roasting, smelting and refining of lead ore is ever present, since whenever lead ores are heated or handled fume or dust may contaminate the workroom atmosphere. Sintering and lead refining will usually present greater lead hazards than smelting. Handling and transporting lead calcine or sinter in the dry state frequently results in lead hazards as does the preparation of the blast furnace charge.

Cleaning of the flue system, including bag houses and electric precipitators, will result in high exposures to lead and to certain other toxic metals present in the flue dust. Bucking, parting and sample preparation rooms are frequently contaminated with lead dust when materials being handled contain lead. The use of compressed air for cleaning equipment will add to workroom contamination.

Lead is usually found associated with zinc ores and frequently with copper ores. This being true, lead hazards may occur at copper and zinc roasting, and copper smelting and refining operations. The handling and treatment of zinc calcines frequently result in lead hazards, and particularly the drying and loading of residue from zinc leaching operations. Lead hazards in cadmium refining plants, and in acid plants where lead burning is done may also occur.

Such miscellaneous operations as lead casting and burning may result in lead hazards, particularly if this work is done in confined places. In bronze foundries, lead hazards may result from melting, pouring and even from shake-out and molding. Sources of lead dust during the latter operations are from the molding sand which will normally become contaminated with lead through continued use with bronze.

ZINC. Compared with lead, arsenic, and certain other metals, zinc has a low order of toxicity. The principal hazard in exposure to zinc is the breathing of freshly formed zinc oxide fume. Such exposure may occur in the refining, melting and pouring of zinc metal and the handling and refining of lead blast furnace spiess. While other zinc exposures may occur in a smelter, there are usually other materials present which have a higher order or toxicity and therefore constitute the chief hazard. In such cases, control of the more hazardous material will result in control of the zinc hazard.

ARSENIC. Arsenic may be found in the atmosphere of many departments of a smelter although more serious hazards will occur in cleaning flues, bag houses and electric precipitators, loading and unloading flue dust, roasting and refining arsenic and roasting of ores. The dropping of dry flue dust from hoppers or the cleaning of bag house floors will normally be very dusty, as will clean-up around loading stations, and the initial stages of spraying dust cars with water. In the roasting of ores containing arsenic, fume may be discharged to the workroom atmosphere; however, the extent of the hazard will depend on the type and operating condition of the roasting furnaces, operating procedures and the suction head applied to the furnaces through the flue. Operations connected with arsenic roasting and refining, such as loading and unloading flue dust or crude arsenic, cleaning of arsenic kitchens and the handling of refined arsenic may result in serious exposures to arsenic. Other but perhaps less serious arsenic hazards may occur at copper reverberatory and converter blast furnaces, lead and lead dross kettles. Where materials containing arsenic are handled in sample preparation rooms, arsenic exposures may occur. In some cases, the atmospheres of even non-arsenic using departments may be contaminated to some extent with arsenic because of their close proximity to departments handling flue dust or other arsenic-containing materials.

Repairmen required to enter roasting or reverberatory furnaces to repair or remove furnace linings may be exposed to high arsenic concentrations.

The extent of the arsenic hazard in the various departments of a smelter will depend to a large extent on the arsenic content of the ores and the processes and handling methods used. The possibility of skin irritation is always present where arsenic is encountered.

ANTIMONY. While antimony may be present in non-ferrous metal ores, the quantity is usually small. The principal exposures to antimony will undoubtedly occur in the handling of flue, bag house and electric precipitator dusts. However, in such cases, exposures to other toxic metals will occur and perhaps constitute more serious hazards. During the refining of lead in dross kettles and of copper in converters, antimony may be liberated and contaminate the workroom atmosphere. In roasting operations there are also possibilities of workroom contamination. The extent of antimony hazards in a smelter will depend on the quantity of antimony present in the ores and the smelting and refining procedures used.

CADMIUM. Non-ferrous ores would not ordinarily contain sufficient cadmium to result in serious exposures to the metal during ore dressing processes, although the metal may present a hazard in sample preparation rooms. As was true in the case of antimony, greater cadmium hazards will probably occur in the handling of flue and bag house dusts than in any other department with the possible exception of the cadmium refinery. During the recovery of cadmium from flue dusts and from the residue resulting from the purification of zinc sulfate solution, either cadmium dust or fume exposure may result. During the melting of cadmium metal, extreme care must be taken to prevent exposure to cadmium oxide fume.

SULFUR DIOXIDE. Large volumes of sulfur dioxide gas will be given off during the roasting of sulfide ores and sufficient quantities may be liberated to the room atmosphere to cause a hazard. Likewise, high concentrations may also occur in the vicinity of reverberatory and converter furnaces. Where overhead cranes are used for handling copper matte and refined copper, the operators may be exposed excessively. These workmen may also be exposed to the various metals which may be liberated during the copper converting process. There are other departments in a smelter where sulfur dioxide gas may occur; however, in these departments concentrations are less likely to be dangerous.

SULFURIC ACID MISTS. Serious sulfuric acid mist hazards may occur in zinc electrolyzing rooms. Sulfuric acid mists in such tank rooms are caused by the liberation of gas bubbles from the cells which carry small droplets of sulfuric acid and in the absence of adequate control, these mists are liberated to the workroom and are breathed by the workmen. This hazard is not only important from the standpoint of breathing the mists but also of skin irritation.

CARBON MONOXIDE. Since the process of combustion may

be a source of carbon monoxide, this gas may be found at smelting operations. However, in actual practice, harmful concentrations of carbon monoxide will not ordinarily result unless incomplete combustion occurs in the various furnaces and the resulting gases are liberated to the workroom.

The use of salamanders or open gas heated burners is a common practice for heating workrooms in smelters during winter months. Provided these devices are not properly vented, carbon monoxide concentrations may occur, particularly where the heating unit is in a confined space.

OTHER HEALTH HAZARDS. Workers in sulfuric acid plants may receive sulfuric acid burns in addition to the possibility of exposure to sulfur dioxide, sulfur trioxide and oxides of nitrogen. However, exposure to the above mentioned gases will usually result only when the process is not operating properly or when leaks occur in the system. Selenium and tellurium may be present in flue dusts and may contribute to toxic metal hazards encountered in the handling and treatment of these dusts. The purification of zinc sulfate leach solution may result in an arsine gas hazard should the solution be acid. Since the zinc sulfate solution is normally neutral at this stage of treatment, the hazard may not occur or be intermittent depending upon the efficiency of the operation.

Atmospheric temperatures in the vicinity of roasters, reverberatory plants and converter furnaces are usually high. During cold weather, workmen may experience sudden changes in temperature due to drafts or to moving about a plant or department in the performance of regular duties. These changes in temperature may be contributing causes of respiratory diseases and general illness.

There may be other health hazards associated with the smelting of copper, lead and zinc, depending on the nature of ores being treated and the processes used. In many smelting processes, exposure to more than one toxic material is common and frequently the necessity of installing engineering control measures may be based on any one or all of the hazards.

Preventive Measures

THE prevention of health hazards in industry is chiefly an engineering problem. Because of variations in smelting processes and the large number of potentially harmful materials encountered in this industry, the control of dusts, fumes, mists and gases is a complex problem. A method of control used successfully in one smelter may not be applicable to another and for this reason each hazard may have to be considered as an individual problem. There are, however, certain general methods of control which may be applied for the elimination of occupational disease hazards. These methods are: (1) Wet methods. (2) Local exhaust ventilation. (3) Isolation of hazardous processes. (4) General ventilation. (5) Personal protection (respirators, protective clothing and protective ointments).

In order for a control method to be completely successful, it should not interfere with the process or with the worker in the performance of his duties. However, in some instances, education of workers to adopt new procedures is necessary to ensure effective control. The application of control to certain processes may necessitate relocation of equipment and changes in general operating procedures.

The prevention of illness among workers due to dust, fume, mist, vapor and gas hazards requires a scientific approach. An understanding of the processes involved and of the principles of ventilation and hood and exhaust system design are necessary.

The first step in the control of a health hazard should be the determination of the nature and extent of the hazard. Once the hazard has been evaluated, it is then necessary to choose the most applicable control method or methods and design and install the control equipment. Proper design of control equipment is essential in order to accomplish the result desired at a minimum cost of installation, operation and maintenance. Adequate maintenance of the equipment and periodic checks of its efficiency through studies of the workroom environment are important.

Good housekeeping is an important aid in reducing health hazards in smelters. Frequent cleaning of equipment and places of dust accumulation and maintaining an orderly plant not only serves to eliminate sources of atmospheric contamination but also has a favorable psychological effect upon workmen.

Wet methods are the cheapest and the most effective methods of controlling dust. These methods are used extensively in many industries but are limited in their application in certain plants since the addition of water may interfere with an operation or process. The entrapment of dusts, fumes, vapors, mists and gases at their point of origin by local exhaust ventilation systems is an effective control method. This method has had wide application in industry in general. The hoods used in this type of control may be of various sizes and shapes and are designed so that the air-borne materials will fall or be projected into the hood in the direction of airflow.

Isolation as a control method involves the principal of concentrating the harmful material sources to one locality or to a single closed space. In this way, hazards are confined to a small area and a minimum number of workers are exposed. Provided when workers are required to enter these areas, they are given complete respiratory protection. An example of isolation of a dusty process is the foundry abrasive cleaning room. These rooms are ventilated and the blaster or operator is equipped with a respiratory protective device.

Where the hazard at an operation or process cannot be controlled by one or a combination of methods described above, it is necessary, to furnish the worker with personal protective devices. If the hazard is a dust, mist, or fume, filter type respiratory protection may be used. Positive pressure masks or helmets may be used for protection against other toxic materials. Personal protection against skin irritants includes the use of ointments, protective clothing, rubber gloves and boots. When personal protection methods are used, close supervision is frequently necessary to attain the desired results.

For further protection of the health of workers, healthful drinking water and sanitary drinking fountains, clean lockers, showers and change houses should be provided. Salt tablets should be provided for workers employed in hot atmospheres to replace the salt lost in sweat.

Summary

CERTAIN processes involved in the preparation, smelting and refining of copper, lead and zinc ores and the treatment processes for certain by-products of these metals have been outlined. Health hazards associated with these processes are discussed as are operations and hazards in plants sometimes operated in conjunction with smelters together with general measures for controlling these health hazards.

The processing of copper, lead and zinc ores and their smelting and refining present many potential health hazards as does the treatment of the by-products of these metals. The most common and important of these are silica dusts, arsenic and lead dusts and fumes, and sulfuric acid mists. Other hazards are zinc, cadmium, antimony, selenium and tellurium dusts and fumes and sulfur dioxide, arsine, nitrogen oxides and carbon monoxide gases. Skin irritation hazards among workers with arsenic dust and acid solutions are common. Many smelter workers are exposed to extremes of temperature which may be a contributing cause of illness.

References

1. LIDDELL, DONALD M.: The Handbook of Non-Ferrous Metallurgy. McGraw-Hill Book Co., New York, 1926.

2. HOFMAN, H. O.: Metallurgy of Zinc and Cadmium. McGraw-Hill Book Co., New York, 1922.

3. NEWTON, JOSEPH, and CURTISS, WILSON L.: Metallurgy of Copper. John Wiley & Sons, New York, 1942.

4. U. S. Public Health Service, Division of Industrial Hygiene, and Utah State Board of Health. The Working Environment and The Health of Workers in Bituminous Coal Mines, Non-Ferrous Metal Mines, and Non-Ferrous Metal Smelters in Utah, 1940.

5. BLOOMFIELD, J. J., and DALLAVALLE, J. M.: The Determination and Control of Industrial Dust. Public Health Bulletin No. 217. April, 1935.

6. TRICE, M. F.: The Foundry Dust Hazard and Its Control. *American*

Journal of Public Health, 30: 760-765, 1940.
7. FULTON, WM. B., et al: A Study of Silicosis in the Silica Brick Industry. Pennsylvania Department of Health, Bureau of Industrial Hygiene, Harrisburg, September, 1939.
8. HAMILTON, ALICE: Industrial Toxicology. The MacMillan Company, New York, 1935.

Industrial Hygiene Panel

—Included in the Third Chicago War Production Conference—

AMONG the Panel Sessions of the Third Chicago War Production Conference held at the Stevens Hotel, Chicago, March 29, 1945, under the sponsorship of the members of the Chicago Technical Societies Council, was that on "Industrial Hygiene Services" presented by the Chicago Section, AMERICAN INDUSTRIAL HYGIENE ASSOCIATION. The purpose of the program as given below, was to acquaint the attending representatives of industry in the Greater Chicago area with the various sources of services available as indicated by the subjects:

CHAIRMAN: WARREN A. COOK, Director of Industrial Hygiene and Engineering Research, Zurich Insurance Companies.

"Federal Government Agencies" — MAJOR ALLEN D. BRANDT, Safety & Security Division, Office of the Chief of Ordnance.

State Divisions of Industrial Hygiene:

"Labor Department"—JAMES CROSSER, JR., Chief Engineer.

"Department of Public Health"—KENNETH MORSE, Supervising Engineer.

"Private Consultants and Universities"—C. O. SAPPINGTON, M.D., DR.P.H., Industrial Hygiene Consultant, and Editor INDUSTRIAL MEDICINE.

"Insurance Companies"—WARREN A. COOK, Zurich Insurance Companies.

"Industry"—JOHN B. LITTLEFIELD, Industrial Hygienist, American Brake Shoe Company.

The number and scope of the Federal Agencies in industrial hygiene are seldom appreciated even by those closely associated with the subject. MAJOR BRANDT, assigned by the U. S. Public Health Service to the Ordnance Department under the immediate direction of LT. COLONEL WILLIAM J. MCCONNELL, presented the following describing these services:

On the Federal Level

ALLEN D. BRANDT: The bulk of the hygiene work of the Federal government is done by five agencies which are, in alphabetical order: Army, Interior Department, Labor Department, Navy, and Public Health Service.

ARMY: The over-all supervision of the Army industrial hygiene program centers in the Occupational Health Division, Preventive Medicine Service, Office of The Surgeon General of the Army. The War Department assumes a certain amount of responsibility for the working conditions and medical services for the employees in the War Department establishments and even in those private plants which have contracts with the War Department of such nature that failure in production might hinder the successful prosecution of the war. The War Department, through the Army Industrial Hygiene Laboratory, the Armored Forces Medical Research Laboratory, the Public Health Service, and the trained industrial hygiene personnel of all categories assigned to the Service Commands, the Army Air Forces, Chemical Warfare Service, Ordnance Department, Transportation Corps, and other headquarters, and to many of the installations and depots, provides complete industrial hygiene services to its employees and to many other workers engaged in the manufacture of materiel and equipment essential to the war effort. These services include (1) research into the toxicity of new materials of interest to the War Department, (2) chemical and engineering field studies to evaluate potential health hazards and to determine the effectiveness of control measures, (3) engineering design of control measures for existing health hazards, particularly ventilating systems, (4) laboratory analysis of atmospheric samples of air contaminants and of bulk samples of potentially harmful substances, and (5) medical surveys and consultations to evaluate and improve the effectiveness of the medical program in the different establishments. Prior to the present war, the Army had no industrial hygiene program. However, the program in effect today is a good one as is evidenced, for example, by the extremely low incidence of occupational diseases in a very hazardous industry — the explosives manufacturing, loading, and storing industry. You will remember that prior to the beginning of the present national emergency the amount of TNT, tetryl, ammonium picrate, lead azide, mercury fulminate and other military explosives manufactured in this country was essentially nil, and almost no shells were being loaded. The plants now doing this work grew from cornfields overnight with not even a nucleus of trained personnel to draw upon. Nevertheless, a good industrial hygiene program was undertaken almost from the start of plant operations, and it has paid real dividends.

INTERIOR DEPARTMENT: The industrial hygiene activities of the Department of the Interior are conducted largely by the Bureau of Mines. These activities consist of (1) development of equipment and procedures for measuring atmospheric contaminants; (2) laboratory studies, surveys, and inspections to evaluate unhygienic conditions and to appraise sanitary and medical facilities in mineral industries; (3) application of control and corrective procedures to improve the working environment; and (4) official testing and approval of respiratory protective devices. Some of the recent developments for measuring atmospheric contaminants are the filter paper sampler for dusts, an improved microprojector for dust counting, the phosphomolybdate method for determining carbon monoxide, and the phenol disulfonic acid method for determining nitrogen oxides. Laboratory studies have been conducted on the composition of Diesel exhaust gases with the viewpoint of evaluating the hazards that might be encountered from the toxic gases from the use of Diesel locomotives in mines and tunnels. Laboratory studies have been conducted on the toxic gases produced by decomposition of electric cable insulation and plastics. Surveys and inspections have been made in coal and metal mines, tunnels, and smelters to evaluate hazards from exposure to pneumoconiosis-producing dusts; heavy metals such as lead, manganese, cadmium, and zinc; gases such as carbon monoxide, aldehydes, and oxides of nitrogen; and to appraise sanitary and medical facilities. In regard to the control of unhygienic conditions, main emphasis has been placed on control of dust in coal mines, with less emphasis on conditions in metal mines, tunnels, and smelters. In coal mines considerable progress has been made in a wider application of water to reduce air dustiness during the cutting of coal, during loading and hauling, and at the tipple. These procedures, together with improved ventilation, have been quite fruitful in improving dust conditions in anthracite and bituminous coal mines. Another control procedure, the use of respiratory protective devices, has continued to receive attention. The Bureau of Mines now approves all types of respiratory protective devices and Bureau approved devices are widely used. Also, information has been made available on the dilution of stack effluents. In addition to the work in the laboratory and in the field, another important phase of the work is the dissemination of information which is accomplished by technical publications, letters, and exhibits, and by visits to the laboratory.

LABOR DEPARTMENT: The industrial hygiene activities of the U. S. Department of Labor are conducted by the Division of Labor Standards. This agency carries on a promotional and service program in the field of industrial health and safety. In this connection, the Division advises management and workers concerning methods for the control of industrial atmospheric contaminants, and excessive heat and humidity, which may be toxic or otherwise injurious to the health and efficiency of workers. In cooperation with recognized authorities in the field of ventilating engineering and by means of surveys by consultants as well as by correspondence, the Division serves as a clearing house of information in these fields throughout the United States, and in addition exchanges pertinent material with other countries. The experience of industries here and abroad is pooled and serves to assist in the solution of many technical difficulties which arise in the control of health hazards. In the synthetic rubber industry, for example, this agency took part in the standardization of control measures

for many of the solvents in use, not only from the standpoint of working efficiency but also for the reduction of fire and explosion hazards. The Division's engineers assist the state labor departments in the formulation of protective codes and regulations.

NAVY: The Industrial Hygiene Division of the Bureau of Medicine and Surgery maintains complete facilities at 15 shore establishments for consultation on industrial hygiene problems in Navy yards and stations. At these activities, there are specially trained medical and technical officers and completely equipped laboratories with scientific apparatus for evaluation of any exposure which might endanger the health of workers. Many other naval activities have officers trained in industrial hygiene with facilities and apparatus for making such tests as dust counts, vapor concentrations, and oxygen deficiency. At those stations where personnel and equipment are not available, these services are furnished from other stations upon request to the District Commandant. In addition to the more or less routine field studies pertaining to the evaluation and control of health hazards, these industrial hygiene units carry out research and development on new sampling devices, methods, and techniques, and on better and simpler methods of control. For the sake of convenience and because of similarity the industrial hygiene program operating in the Maritime Commission is included in this same group. Strictly speaking, it is not part of the naval program but covers all yards not owned by the Navy of which there is a large number. In the conduct of its program the Maritime Commission receives assistance from the Public Health Service, Navy, and State Industrial Hygiene Divisions. The Maritime Commission with the help of personnel from the Public Health Service and the Navy completed recently a special study of welding fumes and their effects upon welders in a representative number of large yards. Among other things, this study included almost 5000 chest x-rays of welders and thousands of samples of welding fumes and gases. The results when compiled will probably go a long way toward establishing conclusively any relationship which may exist between "welder's lung" and occupation.

PUBLIC HEALTH SERVICE: Last, but by no means least, is the Public Health Service. The industrial hygiene program in this agency is carried out by two divisions, the Industrial Hygiene Division and the Industrial Hygiene Research Laboratory. The Industrial Hygiene Division conducts the field operations and has for its objective the health conservation of manpower by protecting and improving the health of the worker. The method of operation is, very briefly, as follows: (1) Personnel and equipment are lent, and other forms of assistance are given to the 47 industrial hygiene units in 38 states. In this connection, 66 trained workers were lent to 28 states, the Tennessee Valley Authority, the Army, and the National Society for the Prevention of Blindness. The personnel are engaged in a variety of activities aimed at the improvement of working conditions and the reduction of sickness absenteeism in many and varied industries and plants. (2) Industrial dentistry and industrial nursing programs are being promoted in industry and in the State and City Industrial Hygiene Units. (3) Seminars are held from time to time to bring all field personnel, Federal, state, city, and industrial up to date on newer procedures and methods. (4) The field work of the industrial hygiene program in all Army-Owned Contractor-Operated Ordnance plants manufacturing or handling explosives is done by personnel from this Division. (5) Personnel and equipment were lent to the Maritime Commission to assist in the shipyard welding study mentioned previously. (6) Other cooperative studies are conducted with such agencies as the Navy, the Rubber Reserve Company, the Naval Medical Research Institute, the War Production Board, the U. S. Department of Labor, the Industrial Hygiene Foundation, and the Army Industrial Hygiene Laboratory on problems vital to the war effort. The Industrial Hygiene Research Laboratory of the National Institute of Health has devoted at least 90% of its efforts and resources during the war years to research and laboratory services requested by the Bureau of Ships, Bureau of Medicine and Surgery, and the Bureau of Aeronautics of the U. S. Navy; the Quartermaster Corps, Ordnance Department, and Office of The Surgeon General of the U. S. Army; and the Medical Division of the U. S. Coast Guard. The remaining 10% of the research has been concerned with determination of the potentially harmful effects of new chemicals prior to their widespread use. All these activities during the fiscal year 1944, for example, resulted in 70 written major confidential reports, and 13 major investigations for other governmental agencies. This work included (1) investigations into the toxicity and potential danger of such substances as new blending ingredients for aviation gasoline, DDT, new explosives, a variety of solvents, and new and strategic metals; (2) testing protective clothing of all kinds for the Armed Forces; (3) studies in sanitary ventilation, that is, the destruction of air-borne bacteria by ultra-violet light; (4) testing and developing breathing equipment for high altitude flying; (5) development of new analytical methods for determining minute amounts of substances; and (6) numerous other special investigations and services all of which pertained directly to the war effort.

State Labor Department

MR. CROSSER outlined the Health and Safety Act of the State of Illinois which gives the State Labor Department authority to issue and enforce orders under the regulations drawn up by the Illinois Industrial Commission. The Labor Department maintains a laboratory and field staff for the investigation of industrial conditions affecting health of the worker. Plans for ventilation systems are submitted to the Labor Department for approval. Requests for services are received from workers, industry, labor unions—in fact, from any one who may have a complaint or may wish to have a condition investigated. Much work devolves upon the Labor Department Industrial Hygiene Division where the reason for leaving a job and applying for unemployment insurance is ascribed to unhealthful working conditions.

State Department of Public Health

MR. MORSE referred to the development of the Department of Public Health Industrial Hygiene Division under the guidance of the U. S. Public Health Service. Proceeding on the basis of service and education, this Division approaches the subject of industrial hygiene as a portion of the whole public health problem. It is recognized that, in addition to the occupational diseases as such which are covered by the Workmen's Compensation Laws, many diseases which are classed as non-occupational have higher rates among occupational groups. Therefore industrial hygiene must be far-reaching if both industry and labor are to benefit. This implies more than engineering activity by itself—attack by the coordinated public health team of medical, dental, nursing, engineering, and chemical professions is also essential. With such a fundamental concept of industrial hygiene problems, surveys are made of occupational disease problems, on the completion of which, detailed reports are submitted in which recommendations are substantiated by factual, impartial findings. MR. MORSE concluded that the Division with which he is associated is an impartial scientific agency of the State Department of Public Health constituted to service industry, labor, the medical profession, and others interested.

Private Consultants and Universities

DR. SAPPINGTON first outlined the universities which are undertaking industrial hygiene services, listing them chronologically. In 1918 the Harvard School of Public Health, Harvard University, presented the first courses on instruction and research in industrial hygiene which lead to degrees of graduate school levels. Since that time Harvard School of Public Health has been most active among the universities in undertaking instruction and research in this subject. PROFESSOR PHILIP DRINKER has been lent for the present to the U. S. Maritime Commission to serve as Chief Industrial Hygiene Consultant to them. In 1922 the Saranac Laboratories introduced in their program pathological experiments on lung tis-

sue of animals exposed to dust. Since then the laboratory facilities have extended to field services which have instituted and supervised industrial hygiene programs for various important industries. The Saranac Laboratories are available for private consultation in research relative to dust conditions and, headed by DR. LEROY U. GARDNER, are the foremost authorities in this field in this country and in the world. With the introduction of the lead tetraethyl problem in 1925, the Kettering Laboratory of Applied Physiology at the University of Cincinnati was set up under the direction of DR. ROBERT A. KEHOE for developing a program to avoid poisoning by this substance in either the manufacturing or blending operations and also in the distribution of gasoline to which lead tetraethyl has been added. Since 1925, the Kettering Laboratories have become interested in many other problems and are available for consultation on a research level. Among the subjects on which they have made outstanding contributions are hydrogen fluoride and other fluorides and the nitroparaffins. In 1935 the Industrial Hygiene Foundation was formulated at Pittsburgh. This group, made up of members including many of the large industrial concerns confronted with occupational disease and industrial hygiene problems, maintained consultation service for the member companies. This Foundation has placed an able staff in the field for this purpose, and has an industrial hygiene laboratory at Mellon Institute to establish a separate department of industrial hygiene was the University of Pittsburgh Medical School which has been engaged in research and private consultation since 1936. At about this time the University of Illinois Medical School, cooperating with the Division of Industrial Hygiene of the State Department of Health, established an industrial clinic which is available to the industry and labor in this area. In 1941 the late DONALD E. CUMMINGS established a Division of Industrial Hygiene at the University of Colorado Medical School and hospital. This is now fully equipped and is undertaking consultation work throughout the Rocky Mountain areas. The School of Public Health at Johns Hopkins University in Baltimore has been collaborating with the Army in the establishment of their industrial hygiene laboratory which was organized in 1943. In 1945 the Pacific Industrial Hygiene and Research Foundation was founded at Los Angeles for the purpose of offering consultation and undertaking industrial hygiene work on a consultation basis. Other universities where industrial hygiene has been conducted are Ohio State University under the direction of DR. EMERY R. HAYHURST; University of Pennsylvania under the direction of HENRY FIELD SMYTH and Columbia University under the direction of DR. FREDERICK FLYNN. Among the private consultants may be mentioned DR. CAREY P. McCORD who serves as consultant for the Chrysler Corporation but is available for, and undertakes, much private consultation. DR. HAYHURST and DR. SMYTH have now discontinued their direct contact with the Universities and are active in consultation. DR. C. O. SAPPINGTON is the fourth of a group who have been active in consultation in this field for over 20 years. Among the engineers may be mentioned WARREN J. TERRY at Somerville, Massachusetts, JOHN B. LITTLEFIELD at Chicago, the B & S Service, New York, and Pittsburgh Testing Laboratories. Ventilation engineers and vendors of ventilation equipment offer engineering services for control of occupational diseases. In describing his own work, DR. SAPPINGTON stated that medicolegal, labor relations and public relations take up the greater part of his present activity and continue to be important phases of the field of industrial hygiene.

Insurance Companies

MR. COOK pointed out that industrial hygiene services presented by the insurance companies were of two types. Most of the insurance companies offering compensation coverage include an engineering department. The men in these engineering departments have more or less extensive training and experience in occupational disease control. The second type of service rendered by a number of the leading compensation companies and certain of the group insurance companies embraces technical services in which are included industrial hygiene laboratories and field equipment together with trained staff for handling these activities. The following companies have such technical set-ups for conducting occupational disease evaluation and control: Aetna Life Insurance Company; American Mutual Liability Insurance Company; Bituminous Casualty Company; Fidelity & Casualty Company of New York; Employers' Liability Assurance Corporation, Ltd.; the Employers Mutuals of Wausau, Wisconsin; Liberty Mutual Company, Metropolitan Life Insurance Company, Michigan Mutual Liability Insurance Company, Travelers Insurance Company, and the Zurich Insurance Companies. These services undertake general surveys of plant conditions for occupational disease exposures, make specific studies of industrial health hazards which may present special problems, recommend control measures where necessary and make routine checks on conditions, usually with complete reports to the industry.

Industry

JOHN B. LITTLEFIELD: Your presence here is evidence that you are interested in industrial hygiene. The industrial hygienist in industrial work can be compared with the Chinese physician; unlike the gentlemen who have preceded me and who, for the most part are called in when the patient is already sick, the hygienist working in industry is there to keep industry well. He is there to seek out potential trouble and provide corrective measures before harm is done. Although the value of industrial hygiene to industry has been proved for over a decade, and with industrial hygiene departments in such varied steel, glass, paint, rubber, chemical, electrical and mining industries, this service is thus far limited to those larger corporations having for the most part a number of plants. The small company with one or two plants and up to 500 or 1,000 men has not felt that it can afford such a service. However, the company of this size can no more afford to do without industrial hygiene than the large corporation. Here the risk is not spread over such a great amount of business, and a few unfortunate cases can cause serious loss, greatly exceeding normal, expected losses, either through direct payment or through increased cost of insurance due to the experience record. Smaller industries need this service; one way to get it is for a number of them, particularly where grouped closely together as in our Clearing District, to organize their own group service much as they now have a medical and hospital service in that area. Another answer is for more trained men to go into private work, taking on the responsibility for inspecting and advising a number of small industries. An experienced industrial hygienist can spot potential hazards in the small plant by quarterly or semi-annual visits, doing dust counts and air analyses where indicated, and by frank discussion with management of processes and materials in use or proposed. The main point is to have continuity of relations with an experienced hygienist who can become well acquainted with the particular industry. What can you expect industrial hygiene to do for you? First, it can improve working conditions. This is done by promoting good housekeeping, through plant surveys and inspections, by uncovering sources of harmful exposure to dust, fume, gases, skin irritants, dangerous light waves or noise, and by developing practical means of eliminating these exposures. The trained hygienist can recommend ventilation, either local or general, shielding, changes in processes, methods or materials, or personal protective equipment as best suits the situation. Experience has proved that such a program has a wide effect; where a better working environment has been provided industry has experienced better labor relations, reduction in illness, absenteeism and labor turnover, and the command of a better class of personnel. Right now foundries are experiencing a critical shortage of labor—the reason is not that the process is much less interesting than machining or forging but that foundries in general are way behind in cleaning up. Now that there are more jobs than men, the man seizes the opportunity to get out of dust, dirt and smoke. Sometimes

industrial hygiene pays an unexpected dividend in an improved product or lower cost of production. To cite a few instances, a drag dusting job in a mechanized molding operation exposed the drag finisher and those around him to a silicosis hazard; three remedies were apparent—to apply local exhausts, to change the material or to change the method of application. A combination of the last two, involving the spraying of an aqueous suspension of coal dust, was adopted. This reduced the dust concentration by 90%, the composition of the dust from 99+% silica to almost nothing, and produced a better finish on the particular casting. Another example can be drawn from a small brass foundry where square welding (or brazing) rods, high in lead content, were ground on pedestal grinders with a serious exposure of the operators to lead dust. Increasing the exhaust only helped slightly as the steady rest, necessary for the work, caused a rebound of the stream of air created by the wheel. A change to a round rod and a centerless grinder, totally enclosed and exhausted completely, eliminated the hazard and greatly reduced the cost of grinding these pieces. The second, and a very valuable service of industrial hygiene to industry, is to protect against and minimize compensation claims. An adequate industrial hygiene control program will catalog and evaluate the hazards present, enabling the company to eliminate those conditions which may lead to compensation cases. Records compiled regularly and showing conditions which exist now may prove invaluable later. Should a case develop this information will show whether or not it is justified. If it is shown by the record to be justified, it can be settled fairly and quickly without the ill feeling resulting from fighting a losing battle. On the other hand, if the records show the case to be without just cause, a clean fight can be waged with a good chance of success. There is nothing more embarrassing than to have to get up on the stand and say "we do not know what the conditions were when John Jones worked in our plant, but they are just about the same now and we find thus and so." How much better to be able to say "our industrial hygienist covered this job in three surveys during the time John Jones worked with us and found the conditions shown in these reports."

AFTER the conclusion of the presentations by the Panel Members, questions from the audience were discussed. As a result of this Panel Session, there is a much more complete understanding of the several industrial hygiene services available in the Greater Chicago area and of the place of each in this field. It was evident that these services are not competitive nor overlapping, but are supplementary, and that each fulfills its special functions in the broad scope included in industrial hygiene.

American Industrial Hygiene Association News of Local Sections

Washington-Baltimore Section

THE first 1945 meeting of the Washington-Baltimore Section of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION was held Tuesday evening, February 27, 1945, at the Governmental Auditorium, Washington, D. C. Members of the Federal Interdepartmental Safety Council were guests of the Section at this meeting. Approximately 50 persons were present.

Discussing "The Role of Women in Industry," DR. ANNA M. BAETJER, of the Department of Physiological Hygiene, Johns Hopkins School of Hygiene and Public Health, and consultant to the Army Industrial Hygiene Laboratory, declared that much that is considered known about the health and working capacity of women workers is opinion rather than fact.

Metropolitan New York Section

AT THE meeting on February 21, a round-table discussion was held on "The Use and Hazards of Methyl Bromide in Industry." Representatives of different organizations discussed the industrial applications, health hazards, safe handling, and methods of detection in the light of their own experience. The discussion was most lively, and all were benefited greatly from the experience of others in this field. During the discussion, it was emphasized particularly that the unbroken skin, itself, is the best protectant against the effect of this chemical. No rubber gloves should be used in the handling of this material. Likewise, no adhesive tape should be applied to the skin as long as the latter is in possible contact with methyl bromide. Early symptoms created by contact with methyl bromide may be mild; however, they may become more serious later on. The recovery may be slow and may take years.

A dinner meeting and round-table discussion was held at the Hotel Bristol, March 22, 1945. The subject for discussion was "Physical Methods—Measurement of Toxic Gases and Vapors in Air." Experts in the construction and use of the interferometer, ultra-violet and infra-red photometer, led the discussion.

Advance meeting dates schedule are as follows: May 10—afternoon meeting; September 3—round-table discussion; October 25—afternoon meeting; December 6—round-table discussion; annual meeting and election of officers.

St. Louis Section

THE first 1945 meeting of the Association was held Monday, February 12 at the York Hotel. The meeting was addressed by DR. DUDLEY A. IRWIN, Medical Director, Aluminum Company of America, and DR. J. W. G. HANNON, Medical Director (U. S.), McIntyre Research, Ltd. (Toronto, Canada) on the subject "Aluminum Prophylaxis and Therapy in Silicosis." DR. IRWIN discussed "The Experimental Aspects," and DR. HANNON "The Clinical Aspects."

Michigan Section

ON JANUARY 17, 1945, the Michigan Section was addressed by DR. K. E. CORRIGAN, on the subject: "X-ray and Radium Hazards." DR. CORRIGAN discussed the increasing use of x-ray and radium in industry as well as in the medical and dental professions and the attendant accident and health hazards associated with their uses.

The Michigan Section program, held on February 28, was divided into three parts as follows: (1) Introductory remarks regarding the nature and toxicity of degreasing solvents by FRANK PATTY, Industrial Hygiene Consultant, General Motors, Research Laboratories Division. (2) A sound slide film in three parts on the design, operation and maintenance of degreasing equipment, prepared and shown through the courtesy of Detrex Corporation. (This was the premier showing of this educational film.)

At the meeting on March 28, WILLIAM G. FREDRICK, SC.D., Chief Chemist, Bureau of Industrial Hygiene, Detroit Department of Health, discussed "The Industrial Hygiene of Some Newer Organic Solvents and Volatile Liquids." Material presented by DR. FREDRICK included the uses, physical and chemical properties and toxicology of some ketones, organo-silicon compounds such as esters and silicones, nitro paraffins, higher alcohols, cellosolves, substituted benzenes such as xylene and cumene, dioxane, styrene and mesityl oxide.

Chicago Section

ON DECEMBER 28, 1944, DR. LEONARD WEBER, Dermatologist, addressed the Chicago Section on the subject "Industrial Dermatosis and Practical Methods of Prevention."

On January 25, the Chicago Section was addressed by MOHE SOLWORTH, of Louisville, Kentucky, on the subject: "Industrial Sanitation." PROFESSOR BURGESS H. JENNINGS, of Northwestern University School of Engineering, presented "Some Recent Developments in Aerosols."

The February 22, meeting was addressed by DR. CAREY P. MCCORD, Medical Adviser Chrysler Corporation, on the subject "The Basophilic Aggregation Test in Lead Poisoning—Twenty Years After Its First Use."

On March 22, the Chicago Section was addressed by FRANCIS R. HOLDEN, PH.D., Industrial Hygienist, Industrial Hygiene Foundation of America, Pittsburgh, on "Occupational Diseases Occurring in Industries Today," and by C. O. SAPPINGTON, M.D., DR.P.H., Editor of INDUSTRIAL MEDICINE, on "Looking Ahead in Occupational Disease Developments."

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